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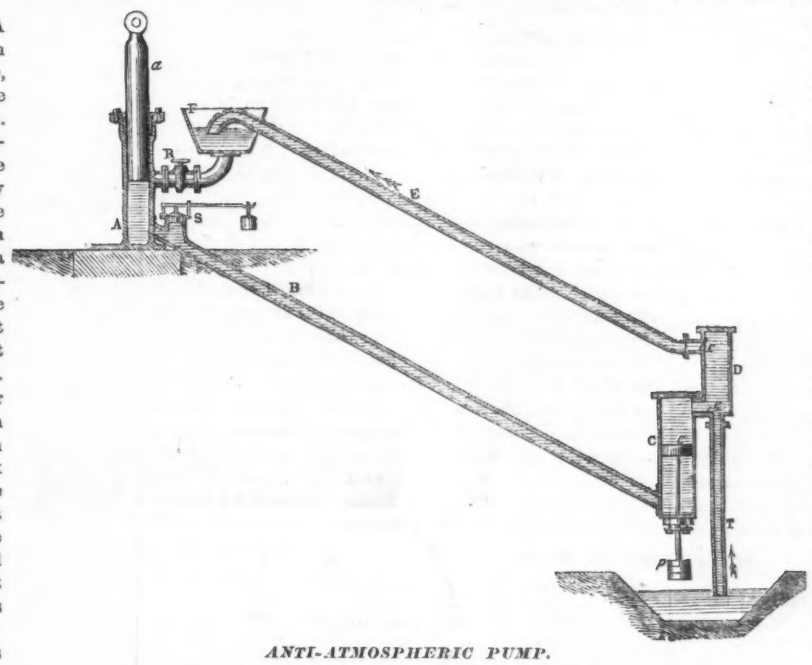
The Verpilleux Pump, for the Raising of Water to any Height.

THIS pump, as its name indicates, was invented by Verpilleux, Jr., of Rive-de-Gier, in France, for the purpose of raising water to any desired height above 30 feet, which is well known to be the limit of ordinary pumps that do not overcome atmospheric pressure. In most cases where water has to be carried to considerable elevations, a series of superimposed "lifts" of pumps is indispensable, whereas by the use of the simple apparatus we are about to describe nothing of the kind is necessary.* The following figure illustrates this pump and its details.

The body of the pump proper is seen at A with its plunger *a*, which receives motion from the driving power, which may be steam, horse, or human. This pump may be placed on the ground, or on a stand in any suitable location. The plunger, instead of sucking water directly through the pipe T, which dips into the water to be raised (and which may be at any depth below the pump), draws it into a pipe B, which communicates at its lower end with a chamber C. In this chamber C is placed a piston *c*, the rod of which carries a counterweight *p* destined to equipoise or balance the oscillatory motions communicated to it by the liquid column in B, whenever it is put into motion by the working of the plunger *a*. The chamber C communicates with another D, and this last one establishes a connection between the suction pipe T and the ascension pipe E, which empties its contents into a tank or vessel F, the height of which above the lower water level is quite arbitrary. R is a cock for the admission of water into the apparatus, in order to replace losses or to fill it up at the start. A safety-valve is placed at S to preclude the possibility of any accidents which might occur from undue pressure.

The above short description of the various portions of this pump is sufficient for the comprehension of its working. The up-and-down motions of the plunger *a* are transmitted to the column of water in B, and through this column to the balanced piston *c*, which in turn acts as an ordinary pump piston in the suction pipe T. At each successive pulsation, the water retained by the valves *e* and *e'* is driven forward, the water being thus conveyed to any desired height.

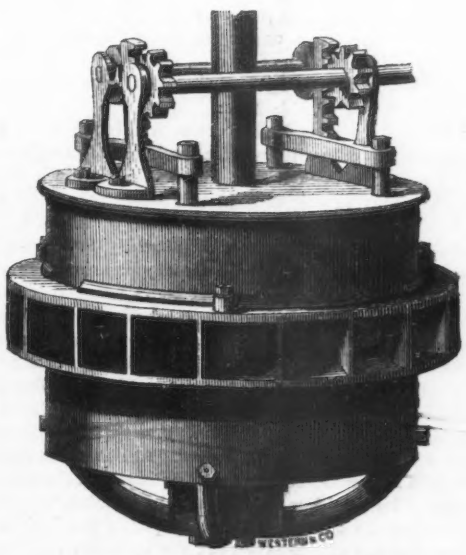
M. Verpilleux is stated by the editors of the *Genie Industriel* to be in the habit of watering his gardens, which are situated 150 feet above the water level, by means of one of these simple but efficient pumps.



ANTI-ATMOSPHERIC PUMP.

An Improved Turbine.

WE remarked in our last issue upon the growing importance and necessity of utilizing the numerous sources of water-power to drive machinery. The turbine as a water motor is gradually superseding the wheel and all such appliances by reason of its greater economy of working and fixing, and its ready adaptability to precipitous and inaccessible localities. The maximum effective result of an overshot water-wheel at the greatest advantage is 80 per cent, and that of a mid-shot, or breast wheel, about 52 per cent, and that of an undershot wheel 32 per cent when under exceptionable working conditions. Turbines are set in place with extreme facility, economizing space and weight; whereas it is just the contrary with water-wheels. Their dynamical result exceeds 80 per cent. of the effective work of an overshot wheel. We have had our attention recently called to an improved turbine, invented and manufactured by Messrs. Hunt, Waite, and Flint, of Orange, Mass. There have been so many improved turbines that care has to be exercised in passing judgment. According to tests reported on good authority, the performance of this turbine was remarkable. The feed, through the square-shaped ports, represented in the cut, was ample, and the buckets well arranged for delivering. But the practical end gained in this form of turbine is excessive simplicity, few parts, and facility of shutting off. These are the great points of advantage in turbines combining in themselves the one great desideratum of *non-liability to be put out of order*. This form of turbine is particularly adapted to work with a small water supply under a high fall that would work a good overshot wheel.



AN IMPROVED TURBINE.

Abortive Inventions—The Ether Steam-Engine.

SOME time ago it was suggested that one of the most useful publications would be a dictionary of failures or abortive inventions, containing illustrated descriptions of machines which did not fulfil the intended purpose, of worthless or injurious chemical or medical prescriptions, of industrial operations which gave undesired results, of silly and stupidly complicated contrivances, made to obtain results which could be obtained in a simple manner, etc., etc. Such a dictionary would undoubtedly be useful, as it would effect a great saving of time and money, if each would-be inventor, with the same trifling pains as looking for a name in a city directory, could at once see the thing he intends trying, has perhaps been tried scores of times before, and always failed.

We all know how often the same things are reinvented and reappear in a different form. Take, for instance, perpetual motion, increase of motive power, rotary steam-engines, economical electro-magnetic engines, etc.

The objections, however, which we see against such a dictionary are that it would be exceedingly voluminous, consequently expensive, also that it is very doubtful if an author could be found who has patience enough to spend years of labor to compile all this kind of information, and finally the difficulty he would labor under to obtain the necessary information, as inventors do not like to have their failures and blunders chronicled.

We had lately occasion to see at the Novelty Works, New-York (which are a kind of headquarters of new inventions tried on a large scale), several hundreds of remnants of different patented and not patented machines, for different purposes, all failures and thrown aside as such. From time to time, when the heap becomes too large, and the sheds overflow, a number is taken out and broken up as old material. Some were steam-boilers intended to burn petroleum; others were improved (?) steam-engines. Among the latter, we remember several years ago to have seen a large engine intended to use ether vapor in place of water vapor. The notion was that there would be a great saving of fuel; firstly, because the boiling-point of ether was so low, 90° in place of 212°, and, secondly, that the latent heat of ether vapor was per pound only 160 units, while that of steam is 970; so that ether, while changing from the liquid to the gaseous form, was supposed to consume less than one eighth of the heat required for water vapor, which, combined with the fact that this takes place at a temperature of 120° below that required by water, gave high ideas of its value.

It was tried on a magnificent scale, and a large ether machine was built, but unfortunately many practical difficulties presented themselves: firstly, the ether was such a powerful solvent for fats and oils, that it was found next to impossible to keep any thing properly lubricated; secondly, it was so penetrating that it would escape freely through joints perfectly tight for steam; and, thirdly, when leaking out of any place it took at once fire—compared with this steam, was very safe, even when the boiler did burst; fourthly, it was very expensive to fill a boiler of moderate dimensions; when filled with water, of course it cost nothing, but it took several hundred dollars' worth of ether; fifthly, it was of course a condensing engine, as it would be both wasteful and dangerous to blow off the expensive and combustible ether steam but the condensation required in the surface-condenser, for reason of the great volatility, plenty of very cool water, and an air-pump, which at the piston side exhausted and at the side of the condenser acted by compression, in order to liquefy the ether vapor, and this pump consequently consumed a great part of the engine's power.

But the worst feature was this, that the idea that ether requires much less latent heat than water in order to change into vapor, was erroneous; the fact was overlooked that ether vapor is more than five times heavier than water vapor, the specific gravity being, for air = 1, for ether 2.5, and water 0.45; therefore, in order to find the latent heat for equal volumes (with which alone we have to deal, in order to fill the space in the cylinder under the piston of our steam-engine), we must multiply the specific gravity with the corresponding latent heat; this gives us for the comparative latent heat of water and ether, for equal bulks, $0.45 \times 970 = 436.5$ for water, and $2.5 \times 160 = 400$ for ether.

It is seen that these figures do not differ so much, and it has been found in general that for all other liquids, when we reduce the latent heat of their vapors (usually given for equal weights) to latent heat for equal volumes or bulk, taking in account the very different specific gravities of these vapors, the numbers expressing them are approximately equal, which means that the same volume of vapor will be produced from all liquids by the same amount of heat. *No real advantage can therefore be gained by substituting in a steam-engine for water, ether or any other liquid.*

Flying Machines.

MUCH has been recently noticed in the leading journals of some experiments with an aërial machine, recently exhibited at Shell Mound Park, San Francisco. The machine, the principle of which does not appear to be novel, has been built by the Aërial Steam Navigation Company. Beyond making this statement, we do not consider the subject worthy of the notice of a scientific review, for we are convinced that unless some new and more mechanically economic motive power be discovered, or some totally different proposal suggested, all experimenting in this cause is unscientific and futile.

* In a future number of THE ENGINEERING AND MINING JOURNAL we hope to furnish descriptions of several other contrivances for the same purpose which are little known on this side of the Atlantic. These are Prudhomme's pump, Baudot's hydraulic elevator, George's atmospheric pump, etc. Hydraulic engineering has been too much neglected of late years, but we propose giving it a fair place in our paper.

Desilverization of Argentiferous Lead by Means of Zinc.

BY H. B. CORNWALL, ENGINEER.

THE lead remaining in the Pattinson kettle, after the zinc and silver alloy has been removed, retains from 0.6 to 0.77 % of zinc, which is sufficient to render it useless for most purposes, and it also contains nearly all of the antimony originally present. To free it from these and other impurities, it must be refined, and in the present article the various methods employed for this purpose will be described.

They may be classified thus: 1. Treatment of the lead with substances yielding chlorine. 2. Smelting the lead in a shaft furnace with silicious substances. 3. Oxidation of the impurities, either by simple exposure of the melted lead to the air, or by the aid of superheated steam or other oxidizing agents. The aim of the methods included in the first class is to convert the zinc into chloride, and the following substances have been used as the chlorinating agents, with more or less success.

Chloride of lead, the use of which was patented by Herbst and Watermann; common salt, employed by Pirath; sulphate of lead and salt, used by Herbst & Co., at Call; Stassfurt kalisalz, from the Stassfurt salt-works, containing alkaline chlorides and chloride of magnesium. It has been used alone, and also with sulphate of lead, obtained from the manufacture of acetate of alumina, and more lately with bisulphate of soda, from sulphuric-acid works, and, finally, a mixture of sand, oxide of lead, and salt has also been proposed.

Chloride of lead was used successfully at the works of Herbst & Co., at Call, and the following account of its use is given by Illing. The chloride of lead is obtained by exposing the dust of the condensation and collecting chambers over the lead furnaces, to the action of hydrochloric acid for some time. It is impure, containing only 62 % of lead instead of 74 %, and is used in the moist state. The lead, still in the desilverizing kettle, is heated for twenty-four hours under a covering of 3½ % of chloride of lead, when the lead salt is decomposed by the zinc, yielding chloride of zinc, which floats as a slag on the lead, and metallic lead which unites with the mass of lead in the kettle. The bath is kept at a moderate temperature, and frequently stirred during the operation, and the very disagreeable fumes that arise are carried off by a hood. The process is continued until all the zinc is converted into chloride, which is shown by the lead flowing clean from the ladle, without leaving a tail or solidifying in it, and the melted lead shows prismatic colors. The presence of antimony is shown by a peculiar reticulated appearance on the surface of the lead, and if this is the case the lead must be further refined before it can be sold. At the works in question this was performed by removing the chloride of zinc, after previously stiffening it with quicklime, and simply keeping the contents of the kettle at a low red heat for twenty-four hours or more, until the antimony was for the most part removed by oxidation. The following analyses show the progress of the operation and the quality of the resulting lead:

	1.	2.	3.	
Antimony,	0.046	0.010	0.005	per cent.
Copper,	0.008	0.011	0.007	"
Iron,	0.004	0.005	0.005	"
Zinc,	0.777	0.005	0.003	"
Silver,	0.00062	0.00062	0.00062	"

No. 1. Desilverized lead.
No. 2. " " after removing the zinc.
No. 3. " " after removing the antimony.

At the Mühlengasse works, Pirath's method is employed, which consists in poling the lead, in a refining furnace, under a covering of 1 % of common salt, for 8–10 hours, when it is tapped into a receiving basin, and then ladled into moulds. Illing is of opinion that the reaction in this case is caused by the formation of oxide of lead which reacts on the salt, forming a compound of oxide of lead with soda, while the liberated chlorine combines with the zinc and lead; the chloride of lead thus formed reacts again upon the zinc. At the works of Herbst & Co., in Call, the lead is treated with an intimate mixture of sulphate of lead and salt. Bergholz thus describes the process. About 220 cwt. of the lead is treated with 3 cwt. of sulphate of lead and 1 cwt. of salt. After it has been kept at a low red heat for 4–5 hours, the slag which forms on the surface begins to become fluid, while oxychloride of zinc, metallic lead, and sulphate of soda are formed. In twenty-four hours every trace of zinc is removed, but nearly all of the antimony remains, and to remove this the slag is taken off, the metal poled for half an hour, and then kept at a red heat to favor the formation of oxides. After forty-eight hours the antimony is reduced to a minimum, and the lead can be ladled out into moulds. The slag, containing sulphate of soda, chloride of lead, and chloride of zinc, is treated in the wet way for the lead and zinc, as will be described in the next article.

Stassfurt-"kalisalz" (*Kaliabraumsalz*) was employed at the Clausthal works, in place of chloride of lead, which could not be easily obtained. The "Kalisalz" was chosen on account of its chloride of magnesium, as this salt yields hydrochloric acid at an elevated temperature, and it was supposed that the nascent acid would have a good effect upon the operation. The lead was heated for twenty-four hours under a covering of 2 % of the salt, and frequently poled. The zinc was removed quite as readily as with chloride of lead, while the fumes were not so annoying, but attempts to remove the antimony by heating the lead in the desilverizing kettle, as was done at the works of Herbst & Co., gave a very impure lead, even after heating it for seventy-two hours. It was necessary to have recourse to a more powerful refining process, which was carried on in a cupelling furnace, for want of any better arrangement. It was treated in charges of 180 cwt., until pure litharge formed on the lead bath. The quality of the lead obtained by the operations just described is shown by the following analyses, published in the *Preuss. Ztschr.* 16 p., 54 *et seq.*:

	1.	2.	3.	4.	
Antimony,	0.0028	0.1963	0.0098	0.0006-8	per cent.
Copper,	0.0021	0.0062	0.0076	0.0004-5	"
Iron,	0.0179	0.0037	0.0013	0.0019-23	"
Zinc,	trace	0.0043	0.0026	0.0023-24	(Bismuth).

No. 1. Pirath, lead refined with salt.
No. 2. Illing, " " "Kalisalz," and in the Pattinson kettle.
No. 3. Illing, " " " " " cupelling furnace.
No. 4. Bergholz, " " sulphate of lead and salt.

At Clausthal sulphate of lead was subsequently used in connection with the "Kalisalz," and the lead was in consequence much more quickly freed from zinc. Still more recently bisulphate of soda has been substituted for the more expensive sulphate of lead with good results. Further experiments in removing the antimony by refining in the desilverizing kettle also gave very good results, as is shown by the following table of analyses (Illing):

	1.	2.	3.	4.	
Copper,	0.1070	0.0054	0.0064	0.0062	per cent.
Antimony,	0.6208	0.0096	0.0080	0.0058	"
Iron,	0.0032	0.0034	0.0019	0.0018	"
Zinc,	0.0013	0.0034	0.0024	0.0024	"
Silver,	0.1200	0.00963	0.00953	0.0013	"

No. 1. Work lead. No. 2. Lead freed from zinc and refined by heating twelve hours in the kettle. No. 3. Lead similarly treated for twenty-four hours in the kettle. No. 4. Lead refined in the cupelling furnace, after being freed from zinc in the kettle.

In the last method with chlorinating agents—namely, treatment with a mixture of sand, oxide of lead and salt, which is mentioned by Bergholz—a somewhat higher temperature is necessary, and the operations must be carried on in a reverberatory furnace, so that the loss of lead would be greater. In this case silicate of lead is formed, which is decomposed by the action of the salt, forming silicate of soda and chloride of lead, and this latter reacts on the zinc. The second method of removing the zinc consists in passing it through a shaft furnace with silicious substances. It was devised by Flack, and has been adopted at the Burgfeyer Hütte, near Mechernich. The lead is charged into a small shaft furnace with a flux containing 33 % of silica. This flux may be puddling slag, marl, clay, iron ore, etc., and by adding sand or lime, the required percentage of silica is secured. The pressure of the blast should not exceed 6 inches of water, so that the loss of lead shall not be too great. The zinc is chiefly taken up by the slag, but is also in part volatilized. The lead is tapped into an iron basin, where the last traces of iron and zinc are removed by poling it with green wood. If much antimony is present the lead is further refined in a reverberatory furnace. The following analyses show the quality of the lead obtained by this means:

	1.	2.	
Iron,	trace	0.004	per cent.
Zinc,		0.003	"
Antimony,	0.0015	0.002	"
Copper,	trace	0.006	"
Silver,	0.0004	0.0009	"

1. By Herr Eisenhuth. 2. By Herr Michaelis.

The third class of operations for removing the zinc and antimony consists in the use of oxidizing agents which shall not oxidize too large a proportion of the lead. This can be done by simply heating the lead in a refining furnace, which would obviate the occurrence of the rather infusible magnesia products obtained in using "Kalisalz," but the process yields a large quantity of scraps and dross, rich in zinc, and difficult to work over, so that the loss of lead and costs of the operation are somewhat large. The use of soda, nitre and superheated air was also found to oxidize too much lead.

Superheated steam, on the other hand, is an agent which promises to be of great use in removing the zinc. The following brief description of its use, as compared with the ordinary means of refining lead, is taken from the *Berg. u. Hütteum. Zeit.*, 1869, Feb. 19th:

"The purer sorts of lead are most readily refined in a reverberatory furnace with an inclined sole, at a low temperature, or by poling them in a Pattinson kettle. If much copper, zinc, antimony, arsenic, or sulphur is present, the metal must be kept for some time at a low red heat, while the dross is frequently removed. The refining generally lasts twenty-four hours, but if more than 5 % of antimony or arsenic is present it may last two days (Spanish lead from Carthagena), and the use of the blast is to be recommended (Freiberg). Another method of refining lead is founded on the use of superheated steam, and this has been employed by the engineer Condurié, at Toulouse, in refining lead desilverized with zinc. The steam being conducted into the red-hot lead rapidly oxidizes the zinc, iron, and a part of the antimony, with but little of the lead, while hydrogen gas is evolved. At Havre, the desilverized lead is treated with superheated steam, and the resulting oxides of lead and zinc are separated by washing."

The zinc can also be removed by poling the lead in the kettle together with litharge, but the operation requires too long a time. The methods employed to separate the silver, zinc, and lead in the rich zinc crust, and to make use of the various products, will be given in the next article, together with a comparison of the various methods of zinc desilverization with each other and with Pattinson's process.

[To be continued.]

GOLD was discovered in California in 1848, silver in Washoe in 1858, and silver at White Pine in 1868.

Furnace and Generator Gases as Fuel.

BY DR. ADOLPH OTT.

EXPERIMENTS for the purpose of making use of certain gases for heating, date from the beginning of the present century, but it is only recently that they have resulted in practical applications. Heating by ordinary fuel is, properly speaking, heating by gases, the flame being generated by the gases issuing from the fuel. The gas-heating, however, of which we propose to treat is the application of the gases of iron or other furnaces, or gases produced in special apparatus, to the purpose of generating heat. The German metallurgist, Lampadius, was probably the first who proposed to utilize the gases generated in certain technical operations. At a more recent date, in the year 1812, the Frenchman, Aubertol applied for a patent for the use of the gases from high furnaces. To another Frenchman, by the name of Sire, a patent was granted in 1836, for a complete system of smelting wrought-iron by the use of these gases. But the method was never put in practice, and, therefore, became public property after the period of fifteen years, according to the French patent laws. It was not before 1837 that universal attention was called to this subject. In this year, the Counsellor of Mines, Faber du Faur, of Wurtemberg, for the first time succeeded in applying the gases from high furnaces to the working of iron. Since that time, this system has been the subject of numerous trials and investigations.

Although the use of furnace-gases for the last-mentioned purpose has since been abandoned, it has found an extensive application for the roasting of ores, the heating of steam-boilers and blasts, the charring of wood, the burning of limestone and bricks, and other purposes where high and equal degrees of temperature are not required.

The system by which gases are generated in especial furnaces, called generators, has, however, become more important, particularly because it admits of the use of the most inferior kinds of fuel—namely, of fuel for which otherwise no advantageous application could be made. As to heating with generator-gases, it may be mentioned that, before Faber's successful application of the high-furnace gases, Bischof had already solved the problem for utilizing the carburets of hydrogen generated from ordinary fuel. Peat-gases generated in the manner indicated by this savant, when burned with air, quickly yielded the highest heat required in the puddling-furnace. Later Austrian metallurgists instituted experiments in Tyrol with charcoal-refuse. These were again taken up in 1842, in the royal foundries at St. Stephan, with the waste of lignite. They were soon afterward minutely described in some of the leading technical journals; and, as there was no patent applied for, they became public property. Since then, the heating with generator-gases, first proposed by Bischof, has met with an almost universal application.

Both the gases issuing from high and other furnaces are termed in German, *gichtgase*. They consist always of a mixture of inflammable and non-inflammable gases. To the former belongs the carbonic oxide, hydrogen, the light and heavy hydrocarburets; to the latter, carbonic acid and nitrogen. The proportions in which these gases are mixed with each other are, of course, very varied; they depend on the nature of the fuel, the temperature and tension of the air entering the furnace, and on the height in which the conveying away of the gases is effected from the furnace. In iron furnaces, which especially come into consideration, the conveyance may be effected at two thirds the weight, without disturbing the smelting process.

From the valuable investigations of Bunsen, Playfair, Ebelmen, Scheerer, Langberg, Heine, and Richters, we possess an exact knowledge of the composition of the gases from the following iron furnaces:

1. The charcoal furnaces at Veckerhagen, by Bunsen; at Clerval, by Ebelmen; at Baerum, in Norway, by Scheerer and Langberg; at Maegdesprung, by Heine; and at Eisenerz, by Richters. 2. The furnace at Audincourt, by Ebelmen. The fuel consists of a mixture of charcoal and seasoned (air-dry) wood. 3. The coke furnace at Vienna and Pont l'Evêque, by the same. 4. The mineral coal furnace at Alferton, by Bunsen and Playfair. Besides these, the analyses of the gases of iron-finery, copper, lead, and silver smelting-furnaces are known; but as their heating power is small, they find as yet but little application.

The composition of the gases, which, with respect to the fuel from which they are generated, is especially important, consist, according to Scheerer, as follows:

	CHARCOAL.		COKE.	MINERAL COAL.
	A.	B.		
Nitrogen,	63.4	59.7	64.4	56.3
Carbonic acid,	5.9	19.4	0.9	15.2
Carbonic oxide,	29.6	20.2	34.6	21.5
Carburet of hydrogen,	1.0	0.3	...	4.2
Hydrogen,	0.1	0.4	0.1	1.0
Olefiant gas,	...	...	...	1.8
Totals,	100.0	100.0	100.0	100.0

From these analyses, the following heating effects have been calculated:

	HEATING EFFECTS.		
	ABSOLUTE.	SPECIFIC.	PYROMETRIC.
Charcoal gas, A,	0.081	0.000105	1250° C.
Charcoal gas, B,	0.060	0.000078	1075° "
Coke gas,	0.077	0.000100	1275° "
Mineral coal gas,	0.162	0.000211	1475° "

It may be mentioned that, under the absolute heating power of a certain kind of fuel, the quantity of heat is understood which is produced by the complete combustion of a certain weight of fuel. The respective numbers in the table express calorics, that of carbon being considered as = 1. The specific heat indicates the quantity generated by a certain

volume of fuel; the one of gaseous heating materials being exceedingly small, as might be expected. If compared with that of solid fuels, it is found that the heating effect of one cubic inch of ordinary charcoal is equal to that of one cubic foot of wood gas, and that one cubic inch of anthracite is equal to one cubic yard of anthracite gas. The temperature of combustion is expressed by the degree of heat observed. Experience has proved that not only inferior kinds of fuel may be used to advantage, by first converting them into gases and then burning the latter with air, but also that the changing of even excellent fuel into gases by this system is the only rational method of producing heat in countries where coal fuel is expensive. The conversion of solid into gaseous fuel is effected in an apparatus resembling a furnace called a gas-generator, which is only partly filled with the combustible. By forcing common air into the lower part of it, carbonic oxides and carbonic acid are formed in various proportions, according to the nature of the fuel and the tension of the blast, etc. In ascending upward, the carbonic acid is transformed into carbonic *oxide*, which is burned at the upper part of the apparatus either with cold or hot blast. The carbonic oxide obtained in this manner is mixed with the nitrogen of the air of combustion, and contains more or less carburetted hydrogen and hydrogen gas, in consequence of a dry distillation which takes place in the upper strata of the fuel.

Hell-Gate Obstructions—Why They Should Be Removed.

BY JULIUS STRIEDINGER, ENGINEER.

FOR several years there has been a gradual but constant increase in the tonnage of vessels engaged in foreign commerce. Forty years ago the maximum tonnage of vessels was about one thousand tons; the maximum tonnage is now about four thousand tons. At the former period, the draught of the largest vessels, when heavy laden, did not exceed eighteen to twenty feet; now, ships daily arrive and depart, drawing twenty-one to twenty-three feet The depth of water on Sandy Hook bar is twenty-three feet and a half at mean low-water, twenty-two and a half at extreme low-water, so that it is imprudent to send a ship of the larger class to sea except at high tide on the bar. It will then be seen that the limit for the passage of vessels at all states of the tides, by way of Sandy Hook, has been reached; while the tonnage of vessels and their draught of water are still increasing. From previous surveys and soundings, it is ascertained that an easy channel-way of thirty feet of water and more may be obtained, and that the removal of the rocks which form the obstructions referred to may be effected without too great a difficulty in Hell-Gate.

There is reason to believe that the increase in the tonnage will be confined to steamers, and that the maximum tonnage of sailing-ships has been obtained. Were the latter class to increase in size, there would be some objections to their entrance by way of Hell-Gate, as the passage-way of Long Island Sound is too narrow for their free navigation; but to steamers there will be none, for they can make a direct course from Montauk Point to the wharves of New-York. Referring to the character of the Hell-Gate obstructions and their mode of remedy, we find that these obstructions are of two kinds, the difficulties arise from two sources—rocks and currents. In some cases the rocks must be removed, and in others the present injurious effect of the currents must be prevented or overcome. The whole space where these obstructions are found is in length less than a nautical mile; yet in this space more harm is suffered and more risk experienced than in all the rest of the navigable waters on this side of New-York, from the eastern entrance of the Sound to the city—a distance of about one hundred and thirty statute miles. The prominent dangers in Hell-Gate are situated between Bread and Cheese and Negro Point. When to the southward and westward of the former, or to the eastward of the latter, the way is clear; but in the intermediate space, the navigator is beset with enormous perils. He is liable to be carried along by swift currents, by which he loses the control of his vessel, and to be dashed against rocks, to come in contact with which would be followed by entire destruction.

Spots in Hell-Gate, which, owing to their exposed situation, intruding as they do into the channels, are: Hallet's Point, Hog's Back, and Holmes' Rock, Gridiron, Pot Rock, Frying Pan, Way's Reef, and Shell Drake. There are besides some rocks of minor consequence, as Blackwell's Rock and some near Woolsey's Bathhouse and off Negro Point. Probably, there are some other rocks near the shore, which might be discovered on a close examination at low water. All of these ought to be *removed*.

A very bad place is Hallet's Point, which extends some distance toward the channel. By the manner which it projects into the current, it creates eddies, both on the flood and ebb Vessels caught in these eddies are placed in peril of being. carried on to shore. The extent of danger arising from the shoal ground is concealed at high water. Hallet's Point might be more easily removed by blasting than any other place in the "gate," because it is accessible during four till five hours of the day.

The actual removal of these obstructions to the free navigation of Hell-Gate is the only remedy—a remedy extending further and covering more ground than appears at the first glance; for these rocks are not only obstacles which positively impede the passage of vessels of a certain class, by rendering the water too shoal for their draught; they create currents flowing counter to the direction of the main current, overlying and innumerable circular eddies running into and each other.

These counter-currents sometimes set directly on shore, as was the case with that of the flood by the "Bread and Cheese," before the new sea-wall was built, and with the cross-currents of both flood and ebb at this point. It is the same with the eddies; vessels caught in them in some places, as in those near Pot Rock, are whirled about from one to the other until they are thrown upon the shore on the rocks in Pot Cove. Thus it is evident that the removal of these rocks is quite as expedient for the safety of small vessels as it is necessary in order that large vessels may use this channel of approach to the city.

But let us not imagine that the eddies and counter-currents in Hell-Gate can be very greatly diminished. The principal points and islands, by which the course of the tidal current is diverted, paralyzed, or reversed, and the greater part of the eddies and counter-currents occasioned by them, must remain essentially unchanged. Our expectation is only that some few of them may be diminished in violence, and, still more, that the convenience and security of navigation will be vastly increased by the actual removal of some of the rocks and shoal ground upon which they tend directly to carry objects within their influence.

Still less do we expect to reduce the velocity of the tidal currents in the main channels. The present state of things can only be altered by a change either in the capacity of the section or in the amount of water flowing through them. Such changes are obviously impracticable.

It will be seen that we differ, in the number of rocks to be removed, with the views of the "Commissioners relative to the Encroachments and Preservation of the Harbor of New-York." These gentlemen recommend the construction of sea-walls, with timber facing, if necessary, on the Gridiron and Hog's Back. That constructions of this kind will diminish the liability of vessels to be carried on to the shoal ground, and prevent injury when carried on, is certain; but works of such a character will cost more than the actual removal of the rocky obstacles by means of blasting, without offering the advantage of widening the passage-way.

On account of the same reasons, we would prefer to see Rylander's Reef removed instead of a conspicuous stone erected beacon on the top of it, as proposed by the Commissioners. Our proposed improvements comprise: 1. The removal of Hallet's Point, Gridiron, Hog's Back, and Holmes' Rock, Pot Rock, Frying Pan, Shell Drake, and Way's Reef, including Rylander's Reef and some smaller rocks. 2. Timber facings on Great Mill Rock and Flood Rock.

Heat Unit—New Method of Determining.

TO THE EDITOR—SIR: The real value of the mechanical equivalent of a unit of heat is far from satisfactorily established, although careful experiments by able operators have furnished us with approximate data of high importance bearing on this important question. Recent researches tend to prove that the usually accepted equivalents are below what takes place in nature. The inductive method of reasoning applied to the present theory of the correlation of forces furnishes many new modes of determining the value of this equivalent.

We shall limit ourselves to-day to one only, out of many, which a little reflection will suggest to any thinking mind. We will take our example from facts connected with the collision of solid bodies. It is an ascertained fact that a cannon-ball, hitting an iron target, fired from a gun heavily loaded with powder, so as to give it a very high velocity, acquires a red or white heat at the moment of its collision, and appears then, for an instant, to the observer as a luminous speck. We will adopt, for the sake of illustration, a supposition of the possibility of a cannon-ball, weighing 100 pounds, being projected the distance of one mile against an iron target weighing 80,000 pounds, and travelling at the theoretical rate of a mile in a second of time. The initial velocity must have been 100 by 5280 feet by 60 seconds, equivalent to a force of 31,680,000 foot-pounds, or 960 horse-power.

The loss in velocity by the action of gravitation, the gun being fired at an angle of 6¼ degrees with the horizon, will be equal to 4,745,410 foot-pounds. The loss by friction of the atmosphere, if we suppose the ball to act as the plane area of its greatest diameter, will be about 401,912 foot-pounds. At the moment of striking the target, another so-called force comes into play—namely, elasticity, causing an additional loss of velocity, which we compute to be approximately equivalent to 1,266,000 foot-pounds. Lastly, another portion of the initial velocity is lost by resistance of the target, which in this case would be 316,800 foot-pounds. Summing up, we find that initial velocity has been partly decomposed into its correlatives as follows:

1. Gravitation,	4,745,410	foot-pounds.
2. Friction,	401,912	" "
3. Elasticity,	1,266,000	" "
4. Resistance,	316,800	" "
Total,	6,730,122	foot-pounds.

Deducting these 6,730,122 foot-pounds from the initial velocity, 31,650,000 foot-pounds, we have 24,919,878 foot-pounds of unconverted velocity remaining in the ball at the time of striking the target. In the above we have purposely neglected to take into account light and electricity, as these are only secondary derivatives from those above named.

The red heat of iron has been shown by Deprety to correspond to a temperature of 1000 degrees Centigrade, or 1832 Fahrenheit. The specific heat of iron being 0·1138, we see that the total number of units of heat contained in a red-hot 100-pound cannon-ball, will be 11,380 Centigrade, or 20,484 Fahrenheit units. These 11,380 Centigrade, or 20,484 Fahrenheit units are, according to our views, the equivalents of 24,919,878 foot-pounds of mechanical work, which, for an instant, have been converted into heat or retarded motion. This would give us 2102 foot-pounds of mechanical work as the equivalent of a Centigrade unit, or 1168 foot-pounds as that of a Fahrenheit unit—numbers which approximate pretty closely to the results of previous calculations. We have here a most remarkable instance of the correlation of some of the forces or modes of motion which govern the universe. Chemical affinity or combustion of gunpowder has been converted into expansion in matter, expansion into tension; tension into mass motion, mass motion into initial velocity; initial velocity into gravitation, friction, elasticity, resistance, heat, light, and electricity, all of which are thus proved to be in reality only various modes of one unique force, motion. So true is this that the relative equivalents of most of these modes of motion may already be roughly approximated from the very insufficient data we possess to-day. When, at some future period, careful experiments shall have been made on projectiles with a view to the special study of this subject, these relative equivalents will certainly be computed with much greater accuracy than has ever been done before.

If instead of simply colliding, as we have supposed to be the case in our example, the ball had penetrated the target, the portion of initial velocity transformed into light and heat in it must have been reconverted into work before it could proceed on its onward course. Had our cannon-ball travelled with the speed of a meteor, a portion of its initial velocity would, in all probability, have been converted into heat and light, this last being, according to all probabilities, nothing else but accelerated motion. We are perfectly aware that in the above sketch we have omitted to take into account many minor decompositions of forces, but we have, we believe, said enough to show the way to others, who may have the leisure or opportunity of doing so, how to arrive at more exact conclusions than those we have been able to furnish, and for which we must crave the indulgence of the reader. J. D.

NEW-YORK CITY, July 6th, 1869.

Colorado—The Bright and the Dark Side.

TO THE EDITOR—SIR: In a recent lecture before the Denver Board of Trade, I found myself face to face with a company of attentive, earnest men, sincerely interested in the future of the rich and beautiful Territory which they have made their home. The days are passed in which mere highflown compliment, or vague, wild prophecies of enormous gain could satisfy these men. Out of the stern lessons of the experience of the last six years, they have gained a knowledge of the difficulties with which they have to contend; and any man who evinces an intelligent perception of those difficulties, and professes the ability to suggest any means of assistance, will command the attention of the people of Colorado. In their own words, what they want to hear is "no blowing, but sterling common-sense." The Denver Board of Trade is no farce. It is the combination of business men, for the first time in the history of the Territory, to promote the good of the whole; and it marks the close of the era of selfish, reckless individual activity—an era in which every man, whether miner, merchant, or ranchero, sought only to make quickly, by fair means or foul, a fortune for himself, and then escape from the country. History has repeatedly shown that this is not the way to build up a new community. The early days of Virginia under the Cavaliers, and those of Massachusetts Bay under the Puritans, afford an instructive contrast in illustration of this principle. It is the men who *come to stay* that are regardful of their own characters, and of the welfare of the land. It is the men who come to "make their pile, and leave," that descend to acts of violence or fraud which they would not commit at home, and pursue their course, making haste to be rich, without regard to the rights of others, or the general good of the community. Let Colorado give thanks that for her, apparently, the days of Ishmael are over, and the days of Israel begun! Difficulties still remain; and among them, none are more likely to be troublesome than those traces of the former state of things which still remain in laws, customs, and the spirit of too many of the people. A few of these I propose to mention in the present letter. If our Colorado friends, looking in the columns of the JOURNAL to find my "opinion about their mines," are disappointed to see how little I say upon that point, let them consider that such an opinion could be but a superficial one, and not so valuable to them as the wisdom of many competent and experienced men of long residence among themselves. Moreover, the said opinion, whatever it may be worth, has been more than once editorially expressed; and I see as yet no reason to change it.

Georgetown feels specially aggrieved by an article in the JOURNAL OF MINING, in which some unpleasant truths were unpleasantly spoken. Now, for the manner of that or any other utterance, I should be at all times ready to make apology, if it had given needless pain; but I shrewdly suspect that the words that hurt are those which are heeded. The article referred to ridiculed the general outcry of Georgetown miners for more Eastern capital and more reduction works, and the boast that in the coming year the mines would produce five times their known yield of the year past. The facts are as they were then set forth. It is true (as was admitted in that article) that a few mines are reasonably well opened, and able to produce from four to ten tons of ore daily; but probably not one of them, without further work in opening new ground, could keep up this rate of production through the

season. The reduction works in operation—Stewart's and Huepeden's—may get ore enough to run steadily; but they do not at present know where it is coming from. They must rely on a precarious supply of custom ore from many different sources. One reason of this state of things, no doubt, is the dissatisfaction of the miners with the prices charged for reduction; and it is claimed that new works, coming in competition, would effect a beneficial change. There is thus a partial dead-lock. The miners would produce more ore if it could be reduced more cheaply; the reduction works would be able to reduce prices (as well as ores) if the supply were more uniform. No matter who is to blame—the question is, Who is to move first?

It should be pointed out, and it is susceptible of the clearest proof, that the general impression of the miners concerning the supposed immense profits of reduction works are entirely erroneous. The smelting works at Georgetown were unable to carry on business profitably, even when receiving the large price of $100 per ton for the treatment of custom ores. Huepeden and Stewart are unable to underbid each other, because a competition at present would ruin both. It is very easy to peep in at the door of a metallurgical establishment, count the number of workmen, estimate the consumption of fuel, and decide that the proprietor must be making one hundred per cent on his investment; but in a country where capital commands on good security twenty-five to thirty per cent, the management of a business requiring capital is cumbered with a thousand expenses, not appreciated, except by the proprietor. Every delay for lack of ore or by reason of repairs is a double loss. The shipment of bullion is costly. Materials are more than costly. Mr. Huepeden, during my visit, hunted through Denver, Central, Georgetown, and other places, in vain for a single article—merely round bar iron of a certain, very ordinary size, for bolts. When ore is purchased by assay, as at Hill's works in Black Hawk, a new and most oppressive expense is added. Professor Hill not infrequently waits six months for his returns from ores for which he paid in cash. In view of all these circumstances, I do not hesitate to say that not one of those who grumble so loudly at the extortion of the owners of reduction works, would be satisfied with the rate of profit upon capital invested which those works have realized. To all this, add another circumstance, the force of which is overwhelming. So long as comparatively little capital has been invested in mines, the miners are not held to perseverance by any particular tie. A temporary discouragement, or, still more frequently, a new and promising discovery in some other region, and a consequent stampede, may half depopulate a district, and completely dry up those little sources of the supply of ores, the aggregate of which would perhaps furnish a respectable basis for reduction works. The miner takes his pick and shovel, and sets forth to seek his fortune, leaving nothing behind more valuable than an old windlass or a hole in the ground. But furnaces and cylinders and heavy machinery and costly foundations and dams and flumes cannot be so transplanted. The owners of such works are therefore situated in some degree as was the Atlantic Telegraph Company when the new cable first began to work successfully. Burdened with the great outlay of construction, and uncertain how long their prosperity might continue, they were obliged to establish high rates at first; but these rates were reduced as the risks grew less, and the prospects of the future became more certainly assured.

The sum of the whole matter is this: The owners of reduction works in Colorado (outside of ordinary stamp-mills, to which I do not at present refer) have a right at present to large profits; yet they are not realizing as much as the capital they employ would bring in other ways. Their business will be more profitable, even at lower rates, when the production of ore has become regular and abundant; and the cure for existing evils is not the establishment of competing works, but the more systematic and persevering development of the mines. There is capital enough in the Territory itself, without drawing on the East, to produce this result. Money was freely subscribed in Denver, the other day, to back up an old claim to a mine which had been made successful by parties who innocently infringed (if indeed they did infringe) on the earlier rights of a discoverer who had long since abandoned his little pit. In other words, money can be had for cursed, piratical, destructive litigation, which is withheld from regular and fruitful industry. This brings us to another evil already active in Colorado. The old set of miners are to a large extent departed, but they have left a legacy in their abandoned coyote-holes which occupy the places where more sober and persevering men would now gladly expend their energies. But no sooner does any one locate a mine and begin its development in earnest, than, on the first token of success, the phantom of a former claimant starts from the shadowy past, and clutches at the fruit of his toil. Every district in the West that, after its fever and chill of speculation, wakes to new and serious activity, finds this incubus upon it. You will hear much more of this subject, for it is high time the whole truth were spoken; and, if there is gall in ink, I will make it "unpleasant" enough to be heard. R.

COLORADO, June 25th, 1869.

Foreign Engineering.

A NEW process of making foundations for bridges in marshy soils has been recently used on a branch line of the Charentes Railways Company. This line crosses a peat valley to the junction of two small rivers. The thickness of peat was so great that any attempt to reach the solid ground would have been very expensive. In order to obtain cheaply a good support for the bridge, two large masses of ballast accurately rammed were made on each bank of the river, and a third one on the peninsula between the two. The slopes of these heaps were pitched with dry stones, for preventing the sand from being washed away by the rain or by the floods in the rivers. Over the ballast a timber platform is laid; this platform carries the girders of the bridge, which has two spans of about 60 feet each. When some sinking down takes place the girders are easily kept to the proper level by packing the ballast under the timber platform; this packing is made by the plate-layers with their ordinary tools. This simple and cheap process has succeeded quite well.

The same difficulty was overcome by a different plan on an ordinary road near Algiers. This road crosses a peaty plain nearly one mile broad; the floods and the elasticity of the ground prevented the formation of an embankment. The road was to be carried over a viaduct across the valley, but the foundations of this viaduct presented serious difficulties, the thickness of peat or of compressible ground being nearly 80 feet. It was quite possible to reach the solid ground with cast-iron tubes sunk with compressed air, or with any other system, but neither the implements nor the suitable workmen were available in the colony, and it was a great expense to bring them, and especially the workmen, from France. The use of timber-piling was of course out of the question, as timber is very expensive in Algiers and quickly becomes rotten; but there was a set of boring implements which the men used to work it. The engineers began boring holes 10 inches diameter down to the solid ground. These holes, lined with thin plate-iron-pipes, were afterward filled with concrete up to the level of the ground. Each of these concrete columns bears a cast iron column. These columns are properly braced together and support the girders of the viaduct, which is divided into spans of about 20 feet, and is 20 feet high over the ground. This system has succeeded very well, and is to be extended to another larger valley.

Gas Testing.

IN the London metropolis, as at home, a war has been raging as to the quality of the gas supplied by the various companies, and referees have been appointed in the consumers' interest to assist the settlement of this grave question. As any such comments may lighten our darkness here, we will give them: The present report of the gas referees is an interesting, we may say a remarkable, document. The light given by gas depends very much on the character of the burner. Two burners may consume gas supplied from one source, and they may each consume the same amount of gas per hour, but they may differ materially in the degree of light which they produce. On this fact depends certain important results. The standard of lighting power, is a sperm candle weighing six to the pound, and burning at the rate of 120 grains per hour. According to the Metropolis Gas Act, 1860, the lighting power of gas is to be tested by an argand burner having 15 holes and a 7-inch chimney, consuming five cubic feet of gas per hour. The standard burner adopted under this act has been known as Sugg's Letheby burner, and is that used until lately by Dr. Letheby in testing gas for the corporation of the city. But the referees now propose to use a different burner, devised by Mr. Sugg, and which so economizes the gas that the same supply which would appear as giving 100 degrees of light by the old standard will give 116 by the new. Thus by the change from "Sugg's Letheby" to "Sugg's New London" argand, the lighting power of the gas is improved 16 per cent. Accordingly, gas, which by the old standard would appear as of 14-candle power, will be reported as 16.24 candle-power gas when measured by the new standard. For some time past the city companies have been supplying gas of 14 candles. If this new standard be adopted, they will have no need to improve the quality of the gas in respect to lighting power. The gas examiners are necessitated to use the apparatus prescribed by the referees, and the result will be that gas formerly reported as having a lighting power of 14 candles will rise immediately to the character of 16 candles.

The referees distinctly state that they have adopted "Mr. Sugg's new burner as the standard for testing common gas, in their new instructions just issued." They also declare the difference between the new and the old standard—though they do not work out the figures to the extent of showing what is lost or gained in candle power. It cannot be said, therefore, that the referees are disguising the character of their proceedings. They seem to look upon it as their duty to get all the lighting power possible out of the gas. They have made experiments with the various gas-burners commonly used by the public, and they show that an enormous waste of gas is daily perpetrated. Such waste decidedly ought to be checked, not only for reasons of economy, but also on account of the nuisance which arises from imperfectly consumed gas. Blackened ceilings and other annoyances may be traced, not to the character of the gas, but to the imperfections of the apparatus used for burning it. All the gas which escapes from the burner, whether made to yield its proper amount of light or not, is duly registered at the meter. Hence may arise the seeming discrepancy sometimes complained of, between the amount of gas consumed and the amount registered. The referees show that a good ordinary fish-tail burner yields only 89 degrees of light as against 100 by Sugg's Letheby. The common bat's-wing is no better, but one that is patented goes as high as 99. There are burners in use so bad that they waste as much as three-fourths of the light. These are the fish-tail sort, a type which seems capable of almost any degree of badness. Yet, strange to say, when applied to cannel gas, these rude and otherwise wasteful burners give better results than the argands, including Sugg's "New London" standard. Hence the importance of adapting the burner to the description of gas which is to be consumed. The referees observe: "As bat's-wing and fish-tail burners are much cheaper than any kind of argands, it would be advantageous to the public if the illuminating power of gas were raised to the lower limit of cannel gas—namely, 20 candles; but there appear to be insuperable obstacles to the adoption of such a change, owing to the limited extent of the supply of cannel coal." It therefore remains for the public to make the best use they can of common gas. It is too much to expect the general adoption of argand burners, but there is one description of bat's-wing which gives an illuminating power of 99, while the best fish-tail is a fraction over 89. The referees say: "Fish-tails are not well suited for common gas, such as is supplied to London and English towns generally." Yet fish-tails have the preference with the public, and in the aggregate a prodigious amount of gas must be wasted.

The referees having changed the standard burner, so as to add at least two candles to the power of the gas, it becomes of importance to know how the law is to be worked. It may be said, on the part of the referees, that it is not their duty to fix the quality of the gas, but only to declare it. Still there can be no doubt that when the city gas companies settled their terms with Mr. Cardwell's committee last year, the candle-power of the gas was estimated by the standard then in use. The 14-candle supply for 1869 has thus far been measured by that standard. But what are the consumers to expect on the 1st of January next? Is the gas to remain the same in itself, merely exhibiting an additional lighting power because burned in a different mode? If so, a reason must be given for such an arrangement. This alteration in the standard burner is equally momentous in reference to the Imperial and South Metropolitan supply. If that supply is only to be of 14-candle power, then if it be measured by the new standard, the gas need be very little more than 12 candles as measured by Sugg's Letheby. These questions will doubtless be settled equitably by and by; but at present we do not see exactly how that is going to be brought about. The change in the standard gas-burner complicates the whole question. One part of London is thereby put out of gear with the rest, for Sugg's new argand is not admissible as a test burner under the Metropolis Gas Act of 1860. Hence five companies will have the new standard and the remaining eight will have another. The standard burner adopted by the referees may be intrinsically the best; but it is requisite that the same apparatus should be adopted everywhere, and that its effect should be properly understood. One standard is required not only for all London, but for all England; otherwise a comparison of lighting power and price will be liable to innumerable mistakes. What degree of candle-power should be demanded is another question. Possibly the terms enforced on the city companies in 1868 were too arduous. 16-candle gas measured by the old standard may be more than the companies can afford at $1.40 per 1000 feet. If so, it can neither be just nor politic to enforce such terms, and they ought to be modified.

Safety-Lamps.

WE receive the following from French sources: If, as in Belgium, Mueseler lamps had been employed in the Monterrad Pit instead of ordinary lamps, which are far from being *safety*, it is probable that the catastrophe which has recently occurred there would have been avoided. Some mines in the Loire coal-field are beginning to use the Mueseler lamps, the mines at Villars among others, and if the mining administration were not so slow in its action it would come to some decision relative to the use of lamps in mines subject to fire-damp. Every one knows that the Davy lamp does not secure complete safety, except in certain atmospheric conditions; that, in certain mixtures of air and proto-carburetted hydrogen, the metallic cylinder allows the flame to pass through it, and an explosion takes place. Notwithstanding, the mining administration still holds to its obsolete decisions concerning the use of the Davy lamp, and takes no action in respect of the various kinds of improved lamps which have made their appearance. It does not forbid their use, but it is careful that you should understand that you use them at your own risk and peril. The Mueseler lamp, which provides almost absolute security, with the property of extinguishing when the proportion of fire-damp mixed with the air attains certain limits, has been sanctioned, to the exclusion of all others, by the Belgian Mining Administration, which has appreciated its merits. The Davy lamp, it is true, since its application to the lighting of mines, has prevented many accidents; but it is also true that the degree of confidence which has been placed in it has been the cause of many accidents, which had been avoided if greater precaution had been taken, or if the conditions required of a true safety-lamp had been better known. The principal inconvenience of the Davy lamp is the facility with which the workman opens it, who is naturally tempted to do this to obtain a better light, or rather by a kind of propensity to infringe the orders he receives. The miner, whose confidence is blind, accustoms himself to trifle with danger, and nine tenths of the explosions of fire-damp are due to his imprudence.

To prevent the opening or unscrewing of the lamp, many systems of fastening have been proposed. Padlocks and screw-fastenings are too great a temptation to the ingenuity of the workman, who has no rest until he has succeeded, by the aid of tools of his own invention, in unscrewing or opening his lamp. Two systems appear to us to obviate this facility of opening. The one is the Bazin invention; the other, the Lermasiaux. The latter consists of a small pneu-

matic lock, composed of a small copper tube, 1·378 inch long, and ·59 inch in diameter, soldered to the body of the lamp, and forming a projecting flange below. This flange receives a double bottom with air-holes, so arranged as to prevent the introduction of any rod whatever into the cylinder. On the opposite side is the fastening-rod, connected with a loose piston, which works in the cylinder, and which is pushed upward by a bell-spring. Closed by a slight pressure from the right to the left, the lamp can only be opened by an instrument which will produce a vacuum. Any other attempt would break the lamp. Thus modified, this apparatus has an iron cap, which shuts with a bayonet movement by means of four clasps, which fit into the extensions of the four rods which run along by the side of the metal chimney. These rods, after having traversed the cap, are firmly soldered to it, and this arrangement tends also to consolidate the lamp, and to render it capable of sustaining heavy shocks. Finally, the metal chimney is fixed to a small metal socket, of ·59 inch, which joins the cap, and is adjusted on a wick-holder of the same height, constructed to burn either flat or round wicks. The fastening-clasps, fixed to the interior, and working invisibly, present an incontestable advantage over screwed caps, in which the thread of the screw quickly begins to wear, and the facility of opening the lamp is increased. The Bazin method depends on the action of an electro-magnet, which is used by the lamp-lighter to open and shut the lamp. This method of fastening may be applied to all lamps, whatever their construction. In the interior of the lamp, which may be of zinc or copper, is an iron bolt, the extremity of which fits into a notch made in the socket of the lamp, and held so that when once caught it cannot be displaced. After trimming it and adjusting the wick, the lamp-lighter places the lamp on an insulator, and, by the action of an electro-magnet applied to the side, forcibly drives the bolt into the notch in the pedestal. The lamp is thus immovably fastened, and can only be reöpened by the same electro-magnetic action applied in the opposite way. It will be seen that, with this method of fastening, it is impossible for the workman to open his lamp, whatever device he may adopt.

Improvement of the Ohio.

WE insert a description of the above extracted from the New-York *Times*:

Three plans have been presented for making the Ohio permanently navigable for boats and barges drawing from four to five feet of water.

First. By a series of wing-dams over the shoals and rapids of the river. These wing-dams would extend from each side of the stream toward the centre, so as to contract the water into a narrower channel, and of sufficient depth for navigation. They should be directly opposite each other, or alternate upon one side and the other. They would not only deepen the water by throwing the whole volume into one part of the channel, but would also, at the same time, extend the rapids over a greater space, and so reduce the fall per mile by extending the inclined plane of the shoal or rapids. Such dam would not retard the passage of boats or barges, as there would be no locks to pass through. This mode of improvement could be made at a trifling expense, and, except at extraordinary low stages of water, would suffice to make the Ohio navigable ten or eleven months in the year, except when impeded by ice. Very little solid masonry, if any, would be required in building such wing-dams, and the abundance of suitable materials, all along the bed of the river, or in the cliffs and hillsides through the valley, would reduce the cost to a very low figure. There are very few days in the year when there is not sufficient water in the river to float boats drawing four feet, if the water were thrown into one narrow channel, or made to pass through a chute. The river in its natural state, in low stages of water, consists of long, deep pools of water, always of sufficient depth for navigation, with shoals or gentle rapids intervening, when wing-dams would be required to make it permanently navigable. I am not aware that any reliable estimates of the cost of such an improvement have been made, but the whole expense would be absolutely insignificant in comparison with the advantages certain to result therefrom. Some idea of the cost of such an improvement may be had thus: A wing-dam, say 1500 feet in length, 30 feet wide at the bottom and 15 feet at the top, and 4 feet high, would contain 5000 cubic yards. Suppose it cost $3 per cubic yard to fill in these rude dams, and considering the fact that sandstone in cliffs is generally found upon one side of the river, where the shoals and rapids occur, or may be taken from the bed of the stream, this cost, per cubic yard, is believed to be far too high; yet at this rate the cost of one dam would be only $5000. Now, suppose 300 such dams, averaging the same cubic contents, and the entire cost would be $4,500,000! This estimate is only an approximation to the actual expense of such a work; yet, considering the abundance, proximity, and facility of obtaining the necessary materials of stone and coarse gravel for such wing-dams, it is believed that there are plenty of men residing in the valley of the Ohio who would be glad to contract for the work at $3 per cubic yard. At this rate this improvement would cost only the trifling sum of $4600 per mile.

A second plan for improving the Ohio is by locks and dams. By this plan the Ohio would be converted into a vast canal, with a capacity sufficient to float the commerce of the whole continent. The distance from Pittsburg (by the river) to Cairo is 977 miles. The whole fall is 425 feet, or an average descent of 5 inches per mile. To overcome this entire fall would require 50 locks or pairs of locks—one for the ascending and one for the descending trade—with an average lift of 8½ feet. The pools erected by such a system of locks and dams would vary in length as follows:

Between Pittsburg and Wheeling,	10 miles.
Wheeling and Cincinnati,	17 "
Cincinnati and Louisville,	25 "
Louisville and Portland,	1 mile.
Portland and Evansville,	42 miles.
Evansville and Cairo,	37 "

This assumption contemplates the necessity of converting the river, through its whole extent, into a canal; whereas, such is the favorable condition and easy flow of this noble river, in its lowest stages of water, consisting of long, deep pools, that it is presumed, in order to convert it into a grand slack-water navigation, not more than one half of the aforesaid number of locks and dams would be required.

Allowing the average cost of these locks and dams to be $500,000, for each pair, the whole expense would be only $12,500,000. No parallel to such a magnificent canal or slack-water navigation could be found in the world. None having so little lockage in proportion to its length. Considering the abundance of fine oak timber and stone, as before mentioned, it is confidently believed that this great work could be constructed within said $12,500,000, or about $12,800 per mile, to make the Ohio a vast channel of trade, with ten times the capacity of the Erie Canal enlarged. If the river were thus improved, not an extra acre of land would be necessarily overflowed, and it is believed that, in a sanitary point of view, the whole valley would be benefited rather than injured: and as the depth of water would be all the way five feet in the channel, there would be little or no obstruction from ice during the winter, or, at any rate, far less than in the natural state of the river. Such grand results, at an expense comparatively so trifling, were never before submitted to public consideration, and the wonder is that this great subject has not received that careful investigation which the growing necessities of the trade and commerce of the world imperiously demand. The opening of our great Pacific Railways and of the Suez Canal invests this great work with an increased importance. The third and last mode of improving the Ohio will be the subject of another article. P. CLARK.

NEW-YORK, June 28th, 1869.

Bermuda Dock.

IN our last issue we made allusion to the sailing of the gigantic floating dock bound for the Bermudas. We have further received the following notification, which has been issued by the Admiralty:

NORTHUMBERLAND AT SEA, START POINT, NW., 15 miles, June 25th.

I beg to forward, for the information of the Lords Commissioners of the Admiralty, the following particulars relative to the Bermuda dock.

Every thing thus far has turned out most satisfactorily. The dock steers remarkably well; the towing cables, led through the stern ports of the towing ships, seem but little to affect their steering power, their rudders not being paralyzed, or even partially so, as was by some people anticipated.

The consumption of coal on board the *Northumberland* and *Agincourt* is at present about 45 per cent per hour, the dock being towed about five knots, the weather being calm, water smooth, and circumstances most favorable. The *Terrible*, though towing astern of the dock, is not a dead drag, as her paddles are kept revolving slowly at an hourly expenditure of about 10 cwt. of coal. If all goes well, as there is reason to anticipate, I shall not communicate with Lisbon.

I might remark that I took the *Bermuda* in tow without the assistance of any lighters' floats. The dock was brought under the *Northumberland's* stern, while she was lying at anchor, and the 26-inch cables readily hauled on board. Before leaving Sheerness these cables were securely lashed on board the *Bermuda* to the riding bits amidships at 50 fathoms length, this being done to prevent the dock yawing in the narrow channels. Finding the dock was steering so satisfactorily, I left well alone, and do not intend to tow to the full scope unless compelled to do so by bad weather or a heavy swell. The weather has continued very hazy since the flotilla left Sheerness; no observations have been obtained or land seen since leaving Dover. I have, therefore, despatched the Medusa to the rendezvous off the Eddystone to warn the *Helicon* and *Lapwing* of our approach and supposed position. Should I not find these vessels, I have directed them to follow down the track laid down by the hydrographer. Every thing goes most satisfactorily, and the following are the quantities of coal remaining on board the larger ships at eight A.M. this day: *Agincourt*, 966 tons; *Northumberland*, 1026 tons. I have, etc., (Signed),

C. H. MAY, Captain and Senior Officer.

Capturing Whales by Electricity.

THE London *Engineer* has the following in regard to capturing whales by electricity: A good deal used to be said about applying explosive bombs in the whale-fishery; but actual trials have shown the plan to be a failure. The explosion of a bomb, if attached to the harpoon, simply destroys the flesh in its neighborhood, and hence also the hold on the fish, which is often thus lost and uselessly killed. From various causes, among which are, no doubt, the general use of gas for lighting, and the discovery of petroleum, the whale-fishery has rather languished of late years, and it probably requires a stimulus such as would be afforded by diminishing its well-known dangers. Whether this object would be obtained by a curious proposal submitted to the Society of Civil and Mechanical Engineers, by Mr. H. J. Rogers, only actual trial could show; but we understand that the project is partly brought forward by practical whale-fishers. A galvanic battery is placed in the whaling-boat with a powerful induction coil in communication. From the terminals of the battery two insulated wires pass as conductors through a line of the size ordinarily used, to the harpoon, which is made with two heads, separated from each other, each insulated wire passing through the harpoon to the points where they terminate. The handle of the harpoon is, of course, insulated. In this harpoon the circuit would be complete when it struck the whale. According to another plan, one insulated wire passes from one terminal through the rope to the end of a harpoon having one point only; the other insulated wire hanging in the water, and acting as a means for the return current. The experiments have been tried on eels and other small fish without perforating the skin. The two wires from the poles of the battery being simply directed in close proximity to each other toward the fish, or one wire at the head and the other at the tail, and the effect has been to produce rigidity and complete temporary paralysis, the eel and other fish appearing perfectly lifeless during and even after the period of contact.

Fusibility of Clays.

THE degree of refrangibility of clays, the various amorphous silicates of alumina, has been proved by Dr. Bischoff to increase with the quantity of alumina. Secondary influences adding to it are the absence of mechanically admixed sand or the presence of a large proportion of water, to a certain extent, also absence of fusible admixtures, in which, however, the action depended not so much on the quantity as on the quality of the fusible elements. Dr. E. Richters, observing, however, that these variable degrees of quality in clays employed for fire-proof material are still, to a large extent, ascribed to the quantity or relative proportion of fusible constituents, has published his results of experiments on their several influences, from which we glean the most important facts.

Hitherto it has been assumed that potash exerts the greatest influence on the fusibility of clays, and next to it iron, then lime; magnesia being scarcely considered capable of exerting any change. This succession of degree, founded, as it no doubt is, upon the deportment at high temperatures of their pure silicates, it now appears must be reversed, the general conclusion arrived at by Dr. Richters being that the fusibility of a variety of clay, if of the character of a two-third silicate, is favored most by magnesia, less by lime, still less by ferric oxide, and least of all by potassa. "From a theoretical point of view, it is to be observed that this series is in the order of magnitude of atomic weight, and that this variable influence is actually directly in inverse proportion to the equivalents. A further point of interest was the relative influence of these fluxes upon the fusibility of a clay when at the same time the percentage of silica was increased, the experiments being made with fire-proof material and variable proportions of flux and silica, under the supposition that the fusibility should increase with the proportion of silica. The result entirely confirmed this hypothesis, so that it may be concluded that the degree of fusibility depends upon the proportions and conditions existing between [illegible] silica, and that similar effects are produced by equivalent quantities of the oxides."

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These facts will in the future give the means to determine by chemical analysis the probable action of heat on any clay intended for fire-proof structures, and the temperature to which it may be exposed.—*Exchange.*

Queries.

T. C. P., OF OHIO.—It is a bad plan to cut off with the eccentric alone. The cut-off should be an independent arrangement.

J. T., OF MICH., asks if a circular saw requires more motion in feeding fast than it does in slow feed. Of course, the faster you run it, the faster you may feed it, and *vice versa*, within reasonable limits. When you are going to use such a saw, you will speedily discover this.

S. R. B., OF MD.—"The diamond-pointed gold pens are, of course, only called so, but the points are very hard—What is it?" Iridium, the metal just mentioned in the former answer to a correspondent of this city. Only metal can be soldered to metal—stones could not be attached to such fine points; but the iridium, although it may be much less hard than many gems, is so hard in comparison to paper that an iridium-pointed pen lasts for years without any appreciable change.

S. R., OF COLORADO.—"What is the simplest form for the extraction of gold and silver by chlorine?" *Answer.*—Stamp your quartz as finely as possible, for which purpose it may, in some cases, be well to heat and throw cold water on it. This makes it more fragile. Moisten this fine powder with warm water, and place it in thin layers on the bottom of earthen or leaden vessels, in which chlorine gas is conducted. The gas may, by means of tubes, be led from one vessel to another, so that the gas not absorbed by the first, is led into the second, third, and so on. An improvement in this process is to have perforated sieves, on which the ore lies, and to have the chlorine gas pass upward through them, like common gas passes in the gas-works through the lime-purifier. The moist mass is then treated with water, which dissolves the chloride of gold, which then may be precipitated by a solution of chloride of antimony, or any other of the well-known means.

If silver is present in the ore, it will remain as a chloride in the powdered quartz, because this is insoluble in water. It may be dissolved, however, by a hot solution of common salt, or, better, hyposulphite of soda. In this way, the quartz-powder is entirely freed from the metallic ingredients. The silver solution may then be treated in the usual way to precipitate the silver.

MINING SUMMARY.

Nevada.

WHITE PINE MILLING OPERATIONS.

THE *News* says that in a short time the milling capacity will be increased to one hundred and eighty-five stamps, and will be doubled during the summer. Meanwhile, large stacks of ore are accumulating at the mine-dumps. It is not unlikely the district will turn out $150,000 to $200,000 a week in a few months hence, and $500,000 is promised for July, to begin with. The shipments from this source will partly meet the enlarged demand for money created by the rapid industrial development of California and Nevada.

YIELD OF THE MINES.

A correspondent of the San Francisco *Herald* gives the following statistics of the yield of the mines, gathered from the returns to the United States Assessor:

	Tons.	*Pounds.*	*Per Ton.*	*Total.*
Aurora South,	153	....	$92.25	$14,114.25
Amador,	1	1550	311.65	553.17
Andes,	3	1000	106.00	371.00
Baker Metallurgical,	..	548	6874.19	1,883.50
Con. Combination,	1	1000	126.00	189.00
Eberhardt,	480	....	390.00	187,200.00
Eclipse,	2	616	734.83	1,693.58
Genesee,	5	....	122.40	612.00
Hidden Treasure,	8	1000	100.00	880.00
Highland Chief,	3	500	190.00	617.50
Keystone,	179	....	192.00	34,368.00
Mazeppa,	14	....	307.00	4,298.00
Mississippi,	2	714	296.07	697.83
Nevada,	12	....	246.67	2,960.00
Noon Day,	12	....	126.92	1,523.04
Othello,	7	1500	340.00	2,635.00
Romulus,	..	618	299.08	92.51
San Rita,	2	....	57.50	115.00
Stonewall,	54	....	157.60	7,510.40
Union,	5	1300	120.93	683.24

The writer adds that the mines will probably maintain this average.

VALUE OF PROPERTY IN HAMILTON.

THE *Inland Empire* of June 20th says: "We learn from Mr. George Lamerceaux, City Assessor, that he has just completed the assessing of the property of this city, and that it amounts to $1,250,000. We are not disposed to crow or say any thing we cannot back up, but we are satisfied that there is not another town of eight months old in the world which can show the same amount of prosperity. We do not hesitate to say that by the time the town is one year old the amount of assessable property will be at least $2,000,000. This certainly shows a healthy condition of affairs in White Pine. This is now the second city of the State, and next year it will be the first, and the third year, we are satisfied it will be larger than all the rest in the State, while White Pine County will have more assessable property than the balance of the State all put together, unless there is a second White Pine country discovered."

GOOD YIELD.

SAYS the Hamilton *Empire*, June 27th: "One hundred and twenty-five tons of ore from the Rattler mine, crushed at Dunn & McCone's mill, last week, yielded $19,040, or $152.82 per ton. This mine has thousands of tons of the same kind of ore in sight."

MINING TITLES.

FROM the Treasure City *News* of June 28th we cull the annexed: "The Alturas and Industry mines were connected on Thursday night last by the former breaking through into the works of the latter. Saturday night the Posthole broke through into the Alturas, and the latter's title not being as old as the former, the Alturas surrendered its ground and disappeared from the mining arena. The surrender was unconditional and absolute, and the legal fraternity is cheated out of a lawsuit; but the Posthole did the fair thing, it gave up all the rock extracted by the Alturas Company, and even purchased the tools used in that shaft, paying a fair price for the same. The Alturas has taken out a large quantity of rich ore, the exact amount being unknown, as the manager of that mine refused the press admission, and declined having his mine 'in the paper.' This connects the Posthole and Industry mines at a depth of thirty feet, the Alturas shaft being the vertex of the angle formed by the drifts. The drifts, however, do not connect on the same level—the Industry being thirty-five and the Posthole twenty-five feet deep."

SMELTING WORKS.

MOSHEIMER'S smelting-works at Treasure City are rapidly approaching completion. The boilers are in position, and workmen are building the furnaces.

THE BATTLE MOUNTAIN COPPER AND SILVER INTERESTS.

The Austin *Reveille* says: "Of all the mining districts in Eastern Nevada, we doubt if there is one whose prospects are better, or whose future rests on a more stable foundation, than the district of Battle Mountain. Its numerous veins of copper ore and argentiferous galena which, up to the present time, had been of no practical value to their owners, have been brought by the railroad within reach of the smelting-works of Boston and Swansea, at rates of transportation which make it profitable for them to extract their ores and ship them to San Francisco, where they find a ready market, at prices fixed according to the richness of the ores. The advantages of this mode of mining to men of small means, or even of no means, are obvious. It does away with the necessity of truckling to capital for the erection of reduction-works, and to the long and disheartening delays incident thereto. It leads to no deception or disappointment. The miner knows when he ships his ore what he may expect to realize with more certainty than the farmer when he ships his wheat. If he makes a blunder in this respect, he has no one to blame but his own negligence or stupidity.

"The business of shipping ore from Battle Mountain to San Francisco has already been inaugurated, and the result has been satisfactory to the shippers, though the railroad charges $14 per ton, a price altogether too high, and which, we are informed, will be greatly reduced after July 1st. We are indebted to Mr. Robert Cullen, who has just disposed of a small lot of Battle Mountain copper ore at the Bay, for the following schedule of prices paid there for copper ores:

Ores containing 15 per cent of copper				$33.75
Ores	"	25	"	" 63.75
Ores	"	35	"	" 92.75
Ores	"	50	"	" 150.00

"These ores are generally purchased for the Boston and Swansea markets. The argentiferous galena ores are bought as readily, at prices corresponding with their assayed value, the lead being taken account of.

"Mining is already being carried on at Battle Mountain with considerable activity. The Great Central Silver and Copper Mining Company, incorporated in San Francisco, have commenced operations on a number of claims, and will soon ship ore to that city. Their ores are copper ores. The Battle Mountain Copper and Silver Mining Company are working the Bay View and Red Rover ledges, and are now sacking ore for San Francisco. Their ores are also copper. The principal mines now in process of development are the Union, Arizona, Mountain View, Bay View, and Red Rover. A number of important discoveries, both in silver and copper, have recently been made, and Messrs. A. Jacobs & Co. have discovered a mine of argentiferous galena which assays up in the hundreds, and the camp has a lively appearance.

"The silver interest in the district looks promising. The Little Giant mill, of five stamps, has averaged $1000 per day for the last six months. It crushes wet, without roasting, and is distant about seven miles from Battle Mountain Station. This latter place is fast becoming a point of importance. The C. P. R. R. Company have directed a freight-house to be built there, with side-track, platform, etc., showing that they realize the merits of the place. Supplies of all kinds are cheaper there than at any other mining-camp in the State; the pastoral and agricultural resources are equal to the best; and, on the whole, Battle Mountain District possesses attractions inferior to no district in the State."

THE COMSTOCK LODE—IMPERIAL COMPANY.

FROM the Annual Report of the Imperial Company, for the fiscal year ending May 31st, 1869, we make the following extracts. With regard to the operations in the Imperial Empire shaft, the Superintendent says:

"In August last, sinking was resumed in the Imperial Empire shaft, and in January of the present year the shaft had attained a depth of 1100 feet, since which time, stations have been opened on the 1000 and 1100 levels. On the 1000 level, a drift was run to the vein, a distance of 90 feet, where the vein was found to contain only barren quartz. This drift has been continued west into the vein 75 feet without any better result; also a side-drift has been run north 60 feet, from which point a cross-cut has been run east 50 feet, to the clay-wall, which cross-cut did not develop any thing but barren quartz. On the 1100 level, we found the east wall at a distance of fifteen feet from the shaft. A drift on this level has been run 150 feet west into the vein, which contains only porphyry. On this level, we are running a drift south to the Holmes mine, a distance of 248 feet from this shaft. This drift is now 75 feet south of shaft. The summary of work done in this mine for the year past has been the sinking of 225 feet of shaft, and the running of 750 lineal feet of drifts."

From the Secretary's report we take the following recapitulation of the receipts and disbursements from May 31st, 1868, to May 31st, 1869:

RECEIPTS.

For Alta mine		$593,032.52
" Holmes mine		25,775.07
" Rock Point mill		10,101.94
" Gold Hill mill		3,183.58
" Premium		5,583.51
" Discount		159.91
" Lindaur mill		861.95
" General expense		424.50
" Imperial Empire shaft		1,511.72
" Assessment No. 2		100,000.00
		$740,634.70
For book accounts, per report May 31st, 1868	$255.06	
" Office fixtures	1,174.56	
" Cash on hand May 31st, 1868	32,962.51	
		34,392.13
		$775,026.83

DISBURSEMENTS.

For Rock Point dam and mill repairs	$11,448.84	
" General expense	21,478.03	
" Rock Point mill	266,390.03	
" Gold Hill mill	99,872.16	
" Expenses in San Francisco	9,021.77	
" Imperial new drifts	20,162.84	
" Alta mine	211,706.91	
" Holmes mine	5,161.08	
" Legal expense	4,720 76	
" Discount	3,760.56	
" Assaying	4,471.13	
" Treasure freight	1,793.29	
" Dividend	24,000.00	
" Interest	1,018.37	
" Imperial Empire shaft	78,220.78	
		$763,166.55
Assets—		
Book accounts	$3,005.56	
Office fixtures	1,174.56	
Cash on hand May 31st, 1869	7,680.16	
		11,860.28
		$775,026.83

From the Alta mine 42,958 tons of ore were reduced, aggregating $576,371, or an average of $13.37 per ton; and from the Holmes mine, 2214 tons, amounting to $25,775, equal to $11.64 per ton. The cost of reducing 12,333 tons of ore at the Gold Hill mill amounted to $7.84 per ton, and 32,839 tons at the Rock Point mill, $7.60⅞ per ton. The expenses of hauling ore from the mine are included in the above. The cost of extracting 40,975 tons, including drifting, repairs, etc., amounted to $4.784 per ton.

The following is a statement showing the disbursements and receipts of the company, from the date of its going into operation to May 31st, 1869:

DISBURSEMENTS.

For expenditures for milling and mining purposes, including new machinery and improvements		$3,813,773.27
General expense account, for sundries and legal expenses		288,031.11
Assaying		37,558.72
Expenses in San Francisco		59,057.51
Interest		10,237.73
Premium and discount		29,017.81
Treasure freight		30,230.67
Federal tax, paid to Assayer		18,396.93
Dividends		1,067,500.00
Assets—		
Book accounts	$3,005.56	
Office fixtures	1,174.57	
Cash on hand	7,680.16	
	11,860.28	
		$5,365,704.03

RECEIPTS.

Mines and mills—		
Receipts for ores and sundries sold for account of mines and mills		$5,119,374.72
Interest and rents		2,768.79
By proceeds from outside ores		48,828.60
San Francisco office		500.00
General expense		1,309.73
Property sold		1,343.75
Premium and discount		33,829.47
Federal tax, returned by Assayer		406.26
Gold Hill Draining Company		2,284.43
Assessments		150,000.00
Imperial engine shaft		5,058.28
		$5,365,704.03

The available assets of the company, in supplies, consist of timber, lagging, wood, castings, quicksilver, chemicals, etc., and for account as follows:

Gold Hill mill	$3,398.80
Alta mine	1,584.88
Rock Point mill	5,904.04
Imperial Empire shaft	1,724.81
	$12,612.53

The only outstanding liability of this company is $27,000, being balance of subscription ($30,000) to Virginia and Truckee Railroad, payable in equal monthly instalments of $3000.

The officers for the ensuing year are as follows: President, A. K. P. Harmon; Vice-President, Thomas Bell; Thomas Sunderland, A. Hayward, James Freeborn, Robert Sherwood, and Joseph Barron. D. A. Jennings was appointed Secretary.

HEAVY SHIPMENT OF BULLION, ETC.

WELLS, FARGO & Co. made, June 22d, the heaviest shipment of bullion ever made in one day from White Pine—15 bars to San Francisco, $16,465.61, and three bars to the Eastern States, worth $5,657.61, making a total of $22,123.22. The Emersly mine has been sold in the East for $80,000.

California.

THE RIVOT ROASTING PROCESS.

THE career of this process in California has ended, we fear, like many others, with a fee for the Sheriff. The Nevada City *Transcript*, of June 22d, contains the following brief account of the troubles of the company having it in charge:

"The extensive works erected at Canada Hill for the purpose of working sulphurets by the Rivot process, have been closed by the Sheriff, and the process, so far at least as this project is concerned, is a failure. The company made two attempts to erect machinery. After the first attempt the parties in charge of the work visited France to consult Rivot, and returned again. The second time they got their works completed, expending in the neighborhood of $100,000; but the process, which had proved successful on a small scale, failed when the attempt was made to work ore in large bodies."

The San Francisco *Scientific Press*, speaking of this process, says: "This undertaking, under the immediate auspices of Rivot, who was to have visited this country for the purpose of devoting his personal attention to the matter, was an attempt to make out of a laboratory process a working process, in order to save fuel—the chief cost of roasting. It would be premature to decide against it conclusively at present, however, from this standstill, since greater experience or further trial may yet succeed. Prof. Rivot's death certainly is a loss to California.

"There is little to describe in the French mill besides its great cast-iron cylinder; there being in place two fine steam engines, five or six large amalgamating pans, a number of settlers, and in a side department, the entire apparatus, duplicated, on a small scale, with assaying appointments. The cylinder is set in a brick furnace, weighs 21,600 pounds, measures fourteen feet in length, and five in diameter, resting on wheels, on which it is rolled around by the agency of a tangent screw on top. It is charged with a ton of ore. The flames of a wood-fire pass over the cylinder, heating it to a low, red heat, and down on the other side, where they pass under the steam generator. The gases from the cylinder are led out from the end opposite to that where steam is first brought in contact with the ore.

"That the trials of the past month have not been successful in the estimation of those who were in charge or interested, appears evident; we have not been able to learn the precise cause. Probably the roasting was found to require too much time, and the fuel, after all, was too costly, as compared with ordinary roasting. Years ago Mr. John Scott roasted pyrites in this manner, requiring ten hours to desulphurize and oxidize five hundred pounds. A statement of the times required to roast different charges, and the results in general, from some of the late metallurgists of the French mill, would surely be worthy of record, for comparison with the ordinary air roasting. We surmise, further, that the roasting was done in part only to the stage of sulphate, since that is all that a low red heat would effect; while a light red, or white heat, such as is requisite for perfect amalgamation or chlorination would have destroyed the cylinder.

"What was known several years ago as the 'Rivot process,' was an attempt to accomplish similar results chemically with a different tool—the reverberatory furnace—into which steam was injected from above; but it was not successful, owing, as it is stated, to the impossibility of excluding air in the stirring that was found necessary. Another attempt of the kind, with still another tool—the kiln-furnace—is the Hagan process, of which we hear occasionally, but nothing of late."

RESUMPTION OF WORK IN THE GRASS VALLEY MINES.

SOME of the mines in Grass Valley, which were recently closed on account of the strike of the miners, are, we are glad to hear, again at work. It appears that the managers had little or no difficulty in procuring men to work with dynamite—the obnoxious blasting agent which caused the strike; and it is probable that this invaluable compound will continue to be used in this locality, as well as in other mining districts on the Pacific slope, in despite of the efforts of the Grass Valley league. We learn that the Empire mine is again running with both shifts full of men. This is rather an unexpected state of affairs, but many men in Grass Valley now see that combinations to keep men from work are the most foolish things in the world. Outsiders coming into Grass Valley want work and can get it. At the Eureka mine, car-loads of splendid rock are coming to the surface.

CO-OPERATIVE MINING.

A GRASS VALLEY paper notices the fact that a party of practical miners have taken a contract to work the Cariboo ledge, south of the Allison Ranch mine, on the coöperative principle. The owners of the mine furnish every thing, and take a percentage of the net yield, the remainder being divided among the miners. Coöperative mining may yet be one of the most successful methods of working many of the mines now lying idle. It is a most effectual remedy for strikes. Owners and laborers have such a complete mutuality of interests that all are sure to leave nothing undone to insure success. Miners have a direct interest in all economical methods of working, and are sure to get out the most rock for the smallest outlay possible. There is no reason why coöperative mining is not as likely to succeed as many other enterprises, when this principle has been applied.

CINNABAR IN SANTA CRUZ COUNTY.

WHILE at Felton, on Wednesday last, says the Santa Cruz *Sentinel* of June 26th, we were informed that a valuable vein of this

metal (from which quicksilver is produced) has been discovered in this county, about ten miles from Santa Cruz, on the northwest side of the San Lorenzo River, near the ranch of Mr. Staples. Samples of the ore were exhibited, taken from the surface rock, which looked rich—probably 10 per cent of quicksilver. The sample we examined was no doubt broken from slate rock, and was of a scarlet red, tinged with yellow, having fibrous lustre. The mine is represented as extensive, and the rock abundant. Parties interested are now preparing to test the value of the discovery, and if the mine will pay to work, immediate action will be taken to build the proper furnaces to extract the mercury. The Santa Cruz range of mountains is undoubtedly full of cinnabar. On the western slope, as well as on the eastern, cinnabar is mostly found in floats, always extensive where found, and the mine generally proves valuable.

IRON IN CALAVERAS COUNTY.

DR. HEPBURN, a gentleman familiar with the manufacture of iron, from experience in Pennsylvania, reports the discovery of iron ore on a ranch some five miles from the town of Calaveras. The ore, he says, is composed of the peroxide of iron, containing 60 per cent iron. The gangue, consisting of alumina and silicious matter, 15 per cent, which, with the addition of about an equal amount of limestone, will in the blast-furnace afford a liquid flux which is necessary in the perfect manufacture of pig iron. The lode is large, and can be traced for a considerable distance. A shaft has been sunk on the vein to the depth of ten feet, showing a compact mass of ore ten feet wide. The best of hard wood for making charcoal stands immediately around. Within two hundred yards of a furnace site is a quarry of excellent limestone. The Doctor says, from his experience in the manufacture of iron in Pennsylvania, he knows of no place, there or elsewhere, that a blast furnace can be more cheaply run, or pig iron made, than here; that it will be difficult to find a better ore, and it and all other necessary materials so immediately at hand.

RICH MINE AT CAMPTONVILLE.

THE Marysville *Appeal*, of June 24th, says:

"We are informed by a gentleman from the upper country, that while in Camptonville last week, he saw, at the bank of J. P. Brown & Co. the proceeds of the Eureka quartz-mill for ten days' run with five stamps, crushing only day times, about six hundred ounces of gold, valued at $10,000. He was informed that their clean up was $6000 from five days' washing. While at work during their last run, they took out one specimen valued at over $1500. The fortunate owners of this mine are most of them citizens of Camptonville—five in all."

SAVING THE FINEST PARTICLES OF GOLD.

The Grass Valley *National* has the subjoined account of a new apparatus designed to save all the minute particles of gold in the waste water of quartz-mills. Says our contemporary:

"It is well known that the ordinary mill process does not and cannot save all the gold in the ore. Probably on an average not to exceed 90 per cent is saved. Various contrivances have from time to time been devised to secure the fine particles that go to waste. We visited yesterday the works of James T. McDougall, Esq., who has patented an invention for securing these infinitesimal atoms of gold. The invention has been in practical use for several months, extracting the precious metal from the waste water of the Eureka and Idaho mines, and its utility has been positively demonstrated. The contrivance consists of six troughs, each twelve feet by two and a half, inclined at a slight angle. The bottom of the troughs or sluice-boxes are covered with copper plates, amalgamated and thickly studded with square iron pegs, about four inches in height, and half an inch square. Over these pegs are placed closely-fitting copper caps, their outer surface being amalgamated in such a manner that a corner is presented to the stream. In other words, the diagonal of the pegs and caps is parallel with the sides of the sluice-box. The waste water from the Eureka and Idado, from which they have previously extracted all the gold that they possibly could with their blankets, copper plates, rubbers, pans, riffles, buddles, etc., is brought to Mr. McDougall's works, and turned through the troughs we have described. Striking against the pegs, of which the six troughs contain five thousand, the water boils, and surges, and eddies about, so that every atom comes in contact with the amalgamated surfaces. The precipitation of the gold is greatly increased by the electrical action induced by the difference in latent heat between the different metals, copper, iron, and quicksilver. Amalgam forms rapidly, and two men are kept constantly employed in cleaning the copper caps and plates. Owing to the almost microscopal fineness of the gold particles thus saved, the amalgam obtained does not contain as much gold to the ounce as that ordinarily obtained at the quartz-mills. This is, of course, to be expected. Mr. McDougall can tell almost instantly what grade of ore is being worked at the mills above him. When they are running what they call poor rock, his contrivance saves the most gold; when they are crushing rich rock, he does not do as well. The explanation is, that their rock which they call poor may contain as much gold as the rich rock, but it exists in such very fine particles that their mill process cannot arrest it. It is these fine particles that he saves. In their rich rock, their gold being coarser, they save a greater proportion of it. Mr. McDougall informed us as a fact what was new to us before, that the principal gold-bearing rocks of California are not quartz, but talcose slate. He has tried the experiment, and proved it to his own satisfaction. The invention which we have described is one the importance of which cannot be over-estimated. By its use, rock can be worked at a profit, which otherwise would be worthless. It will assist immediately in the development of the country, give employment to thousands, and reconvert deserted mining camps and decayed mining counties to their former activity and prosperity."

Pennsylvania.

THE SLATE TRADE.

AT present there are about fifty slate-quarries in full operation in Lehigh and Northampton counties, which during the last year produced about two hundred thousand squares of slate; out of these, according to the prices obtained, were realized about one million five hundred dollars, with a net profit of about seven hundred and fifty thousand dollars. The working capital is estimated at one million seven hundred thousand dollars, which shows a result of fifty per cent profit on the estimated amount invested. Besides, the quarries can only fill about half their orders, and what they do fill they bring to market under the greatest difficulties. All the quarries in Northampton, excepting a few, have to drag their slate from two to fifteen miles on wagons, which is a great drawback—an immense waste of time and money.—*Allentown Democrat.*

COAL CONSUMED BY THE FURNACES IN THE LEHIGH VALLEY.

BUT few persons have any idea of the vast quantities of coal, iron, and limestone that are annually consumed by the furnaces in the Lehigh Valley, between Easton and Mauch Chunk, and as a matter of interesting information on this subject, we give a statement below, copied from the Allentown *Democrat*, showing in tons the quantity of coal consumed in the course of a year by the respective iron manufacturing establishments in the region named. The statement embraces the furnaces in blast, to go in blast, and average product of iron per month:

Carbon Iron Co., Parryville, two stacks in blast, 3600 tons of coal per month; product, 1800 tons of pig iron per month. Lehigh Valley Iron Co., Coplay, two stacks in blast, and one new, ready to start; 3600 tons of coal per month; 1800 tons of iron per month. Thomas Iron Co., Hokendauqua and Alburtis, five stacks in blast, one unfinished; 10,000 tons of coal per month; 5100 tons of iron per month. Lehigh Crane Iron Co., Catasauqua, six stacks in blast, 9600 tons of coal per month; 4800 tons of iron per month. Allentown Iron Co., four stacks in blast, 7800 tons of coal per month; 3900 tons of iron per month. Roberts Iron Co., Allentown, one stack in blast, one idle; 1700 tons of coal per month; iron product, per month, 850 tons. Lehigh Iron Co., Allentown, one stack unfinished, to go in blast July 1st. Bethlehem Iron Co., Bethlehem, three stacks in blast, 5200 tons of coal per month; iron product, per month, 2600 tons. Carter Iron Co., Lime Ridge, one stack unfinished, soon to go in blast. Glendon Iron Co., South Easton, five stacks, 8800 tons of coal per month; 4400 tons of iron per month. Saucon Iron Co., Hellertown, one stack in blast, one unfinished; 1800 tons of coal per month; iron product, 900 tons per month.

These figures are only approximate, but will give a general idea of the production of pig iron and consumption of coal. The figures, as to number of stacks and location, are believed to be correct, with the exception that since the coal-mining suspension, some five or six stacks have been compelled to blow out for want of fuel. These are at Glendon, Bethlehem, Allentown, and Catasauqua. The other furnaces at present are going at a very low blast, merely sufficient to keep the fires alive, in order to make the coal supply hold out. When all are in operation, the stacks in the Lehigh Valley consume about 800,000 tons of coal per annum, an item constituting in itself an important trade. The coal consumed in a single furnace in a year is equal in tons to the amount consumed for domestic household uses in a town of about fifteen thousand inhabitants.

THE LEHIGH ZINC WORKS.

We take the following from the Philadelphia *Ledger*:

"The works of the Lehigh Zinc Company are among the largest in the United States. The purity of the metal produced, its freedom from arsenic and iron, render it equal to the best produced in France. The buildings occupy a space of about ten acres in South Bethlehem, having the Lehigh Valley Railroad and canal on one side, and the North Pennsylvania Railroad upon the other, so that goods can be shipped directly from the works to New-York and Philadelphia. The works were started in 1853, producing the first zinc white made in the United States from calamine ores by the 'furnace process' and 'tower process,' in combination with the 'bag process of collecting.'

"The ore, after being crushed fine, is mixed with fine coal, in the proportion of 50 pounds of coal to 100 pounds of ore, and in this condition is put into open furnaces, where the zinc is liberated in a gaseous form. The oxide of zinc, which is used for paint, is formed by forcing cold air through the mass of coal and ore in the furnace, which drives the gaseous zinc through various arrangements until it falls into the long muslin bags, in the shape of a pure white powder. After it passes through bolting-cloths, it is ready for market. The metallic zinc is made by excluding the air when it is in a gaseous state. Seven hundred men are employed in the works and mines, and wages and other expenses reach to $50,000 per month. The nominal capital of the company is about $1,000,000. The annual capacity of the entire establishment is given as follows: White oxide of zinc, 3000 tons; spelter, 3650 tons; rolled sheets, 1680 tons.

"The mines of this company are located at Friedensville, Lehigh County, about three miles from Bethlehem, and were discovered in 1847. Their capacity reaches 24,000 tons of ores, of all grades, per annum, consisting of carbonates of zinc. About 300,000 tons of the ore have been removed since operations commenced at the mines. The opening from which most of this great mass has been taken is now 125 feet deep, and embraces an area of about five acres, with levels running from it in every direction. To keep the mines clear from water, numerous expensive engines are used. The main engine has a 32-inch cylinder, working three 22-inch lifting-pumps; there is also a Corliss engine working centrifugal pumps, and a Cornish engine with a 23-inch plunger, and a 50-inch cylinder, all of them throwing out 800 gallons of water per minute, and this work is going on night and day."

Michigan.

THE COPPER MINES—AN IMMENSE MASS.

CORRESPONDENCE of the *Mining Gazette*, dated Calumet, July 1st, says:

"The show at the new Hecla shaft, No. 5, is said to be equal in richness to any thing before opened on the lode. The vein is about eight feet wide, and carries a great many copper boulders of high percentage. With visitors it is a great point of attraction. Work has been commenced on foundation of large friction hoisting engine, all of the machinery of which is on the ground, ready to be put up. The product for the Hecla for June was 250 tons.

"A large rock-breaker, just put up at the kiln-house of the Calumet mine, works finely, and will add greatly to the other facilities, already in use, for reducing rock. The Calumet product for June was 180 tons."

Correspondence from Eagle River says: "The Phœnix looks well. They fired a sand-blast last week, which succeeded in moving the monster mass that has been talked about for so long a time. It is sixty-five feet long, thirty-eight feet high, and from four to five feet thick. It is the largest mass of copper that has ever been found in the vein! The vein looks well, and is full of small masses."

THE GEOLOGICAL SURVEY.

The Marquette *Mining Journal* says: "We learn that so far as the iron region of the Upper Peninsula is concerned, the survey is now organized and in progress, with Major T. B. Brooks, of Negaunee, Mich., in charge as assistant geologist; Professor A. Winchell, of Ann Arbor, being director of the survey.

"The work in the copper region was offered to Professor R. Pumpelly; whether he will do it, or yet have a part of the work in the iron region, we are not informed. All interested in the progress of this survey, and in the development of the material interests of the State, cannot but regret that the meagre appropriation of $8000 should have been divided between the two mineral interests of the Upper Peninsula.

"The whole sum expended with economy, by the right men, would have given a creditable covering, not only of economic and commercial questions, but scientific problems and some explorations over new ground, and thus increased our knowledge of iron in all its relations and produced a valuable contribution to the industrial and scientific literature of the country. But $4000 can do but little more than collect, classify, and generalize the useful facts now existing and work them into a report. This will have value, and is necessary to be done, and probably should be the first work of the survey; but the great State of Michigan should not stop half way in a work of this nature, or string it over an indefinite period by pitiful appropriations, less than many mining companies have repeatedly expended in exploring a single section of land. For the duty of compiling a manual which shall sum up the knowledge and experience of this district, in the line of finding, transporting, and smelting our iron ores, no better selection could have been made than Major Brooks. He brings to the work three years' careful study of the geology of this region, and a large business experience in all departments of the Lake Superior ore and iron trade. Educated as an engineer and surveyor, we shall be disappointed if he does not produce a valuable report."

New-Mexico.

THE CIMMARON MINES.

THE Moreno *Lantern* has the following intelligence: "Matthew Lynch has sold his interest in Maxwell's mill and lode for $50,000 cash, to Colonel Bergmann and John Dodd. Patrick Connelly has sold his interest in the Pacific lode to a Mr. Hayden, of Cincinnati, for $5000. Mr. Pollock at the foot of Grouse Gulch recently cleaned up $282 worth of gold from the labor of six men a day and a half."

THE GOLD MINES.

THE Santa Fé *Gazette* has the following items of mining news:

"The new machinery for the New-Mexico Mining Company arrived last week, and is being put in position for work. We understand it will be in operation by the middle of July.

"The Arroyo Hondo Mining and Ditch Company have received the machinery for their fifteen-stamp quartz-mill, and are actively engaged in putting it up. The works will be run by water-power—the turbine wheel being used as the propeller.

"The gentlemen from this city who visited Abiquiú, about three weeks since, to look into the value of the mines reported to have been discovered in that vicinity, have about all returned. We understand they report good indications for gold, but that the water for washing it will have to be taken to the locality from the Chama—a distance of three or four miles.

"It is understood that the Moreno Ditch would be completed this week, and a sufficient supply of water thereby thrown into the mines to enable the miners to continue work without interruption. The reports from these mines are very flattering. More gold is offered for sale in Elizabethtown than there are greenbacks with which to purchase it."

British Columbia.

FROM KOOTENAY.

MR. JOHNSON, recently from the Kootenay mines, reports that the miners have not at any period looked so flourishing as now; prospects are brighter than ever before. Two new camps have been struck with very satisfactory results. On Perry Creek, several companies are working on bed-rock, making 20 to 30 ounces per day. The surface claims are paying generally from an ounce per day to the hand upward. Hoff & Co. washed up from 14 feet of bed-rock in two days $1250. This is the best pay yet obtained.

FROM BIG BEND.

A GENTLEMAN from Rock Creek reports several companies as doing remarkably well on French Creek. Two companies have made, since the season opened, $1000 to each hand employed, and others expect to do fully as well when they get fairly started. There are some fifty or sixty men at the Bend.

Wisconsin.

THE Monroe *Sentinel* thus reports the discovery of gold in a stone-quarry in its village:

"Last Monday a specimen of rich gold and copper-bearing quartz was picked up by a little girl in a stone-quarry in the eastern part of this village. Chemicals were applied, giving confirmation to the opinon that it was gold. The quartz containing the copper is very rich. Both these specimens would be considered first-class ore in any mining district. There is more of the same sort here, as both the pieces we saw were but fragments broken off by the workmen in the process of quarrying stone."

New-Brunswick.

THE St. John *News* reports the discovery of gold about ten miles below Woodstock, on the St. Andrew's Railroad, where the line crosses Eel River. Those who have had considerable experience in gold mining, to whom specimens have been submitted, declare that the quartz will produce one dollar to the pound, a yield so rich as to cause a latent suspicion that the report is "too good to be true."

Colorado.

MINT STATISTICS.

THE following statistics of the business of the branch mint in Denver City for the past fiscal year are of no little interest. They show a most gratifying increase over the previous year:

Number of bars for the fiscal year ending June 30th, 1868	564
Gross coin value gold and silver same year	$363,017.78
Number of bars of gold and silver melted and assayed for the year ending June 30th, 1869	1406
Coin value of gold deposited	$795,566.38
" " silver "	54,828.63

The Roads of New-York Central Park.

BY WILLIAM H. GRANT, SUPERINTENDING ENGINEER.

THERE was some excuse, in the new condition of our country, some years back, for not taking the lead of other countries in the civilizing art of road-making, and allowances are still to be made, in the recently settled or sparsely settled portions of the country; but in the older portions, surrounding our principal cities and villages, and containing prosperous populations, there would seem to be no palliating circumstances for the common neglect of the public highways. We seldom see the individuals composing a community, practising, in their private affairs, the wasteful economy and unthriftiness that is shown in the treatment of their roads; and it is quite as rare to find a man who is not fully aware of the wisdom of a better policy, and who is not sufficiently intelligent to know how, in some measure, to apply it; but the system of making it everybody's business and nobody's business to attend to the work prevails, and the evil is not corrected.

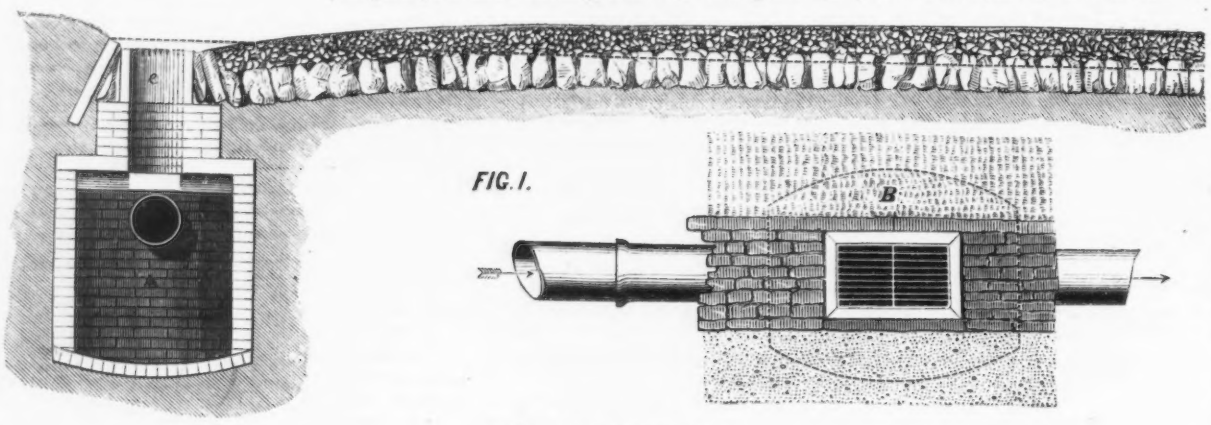

FIG. 1.

THE TELFORD ROAD.

At the commencement of the road-making operations of the Park, in 1858, three different samples of road were made. Suitable ground was selected for the purpose, on the line of an intended road, the width of which was fixed at 45 feet. The samples were from 350 to 500 feet in length, and were intended to test, as far as practicable, the cost, relative qualities, merits and facilities of construction of *gravel roads, Telford roads,* and *MacAdam roads.* The gravel road was first commenced. The samples were not all entirely completed until the forepart of 1859. The depth of road material for all the samples was fixed at fifteen inches. The details of gutters, silt basins, surface and sub-drainage, etc., were matured during the progress of the work. The only material change that was afterward made in the plans of the samples, was in the reduction of the depth of the road materials. In the sample of gravel road, the stone bottoming was composed of two layers; the first was a layer of stones from 3 to 5 inches thick, and 8 to 18 inches long, laid flatwise upon the road-bed, the interstices being filled with stone chips, or spalls. Above this layer was placed the paving, or "Telford" course, composed of stones from 7 to 9 inches in depth, set on edge crosswise of the road, and wedged tightly together, and otherwise treated as will hereafter be described. The object of the double course was, principally, to give the depth of material considered necessary, without the rigidity, and some other inconveniences of construction, caused byusing larger and deeper stones in a single course of paving. It was also further considered, that the bottom layer of stones would serve to make a more equable foundation, on soft ground, the for super-incumbent materials, and at the same time more effectually prevent the working up of the underlying earth. As stated at the time in a report made upon the subject, "The pressure upon any given point, by carriage-wheels or horses' feet, will be distributed (by means of the bottom stones) over a larger area, the upper course, wedged and bound together, acting in some measure as an arch, and transmitting and distributing the pressure to the course below. The tendency of the foundation stones to work upward—a matter that has been a good deal discussed by road-makers—is to be remedied by this means, together with sub-drainage and such an entire depth of road material as to prevent undue action of the frost. The softening of the road-bed, by water retained upon it, permits the stones to settle unequally and become displaced, one end sinking and the other rising, the frost heaving and loosening the mass, and aiding the operation, until the road material becomes generally deranged and imperfect. The method of sub-drainage described, and the depth and form of road materials used, are deemed sufficient to obviate this difficulty in all ordinary cases. . . . The foundation stones, in any upward movement they may be supposed to be subject to, will be met by the resistance of the upper (paved) course, which must rise with them in a considerable mass, unless that course is broken up or displaced by some more than ordinary usage or service." This was said more especially with reference to the gravel road. The kind of gravel road proposed, not having been before to much extent—so far as I could learn—adopted or proved, as in the case of the Telford road, it was thought the more necessary—as it was uncertain whether the gravel would prove so firm and compact a body of material over the foundation, and in aid of the foundation, as MacAdam stone—to give the foundation additional security.* The bottom layer of stones had another advantage, which was, that it admitted of using a considerable portion of inferior stones, as it was not necessary that the stones in this layer should be of so good a quality as those in the paving course. Upon the completion of the paving course, the gravel was deposited on the top, and the road was rolled and finished in the manner that will be more fully described hereafter. The bottom layer of stones was omitted in the Telford sample, following, in this case, the general plan upon which such roads had heretofore been constructed—that of a single paved course, surmounted with the ordinary MacAdam stone. The broken stone on the top of the Telford pavement, and also the last five inches on top of the MacAdam road, were from the hard boulder stones of the Park; the first ten inches of the bottom of the latter road being from the less durable gneiss rock obtained in excavating for the roadways and other works of the Park.

After the samples were completed, and some facts developed as to their cost, and other particulars, it was decided, on the ground of economy, to reduce the depth of the road material in the continuance of the work, and this left no longer in force the principal reason for adding, in the case of the gravel roads, the layer of stones below the paving course—namely: that of giving the additional depth, etc. It would not have been desirable to compose the bottoming of two courses of stone for the modified depth of materials adopted, inasmuch as both courses would have been lighter, and composed of smaller stones, than would be expedient. The question of cost was an important one, and it was thought best to yield to it (though there was no doubt of the utility of the depth of material first used), so far as to restrict the roads next constructed to a depth of about twelve inches. These three samples have formed a part of the "cast drive" of the Park since 1859, and have remained firm, and preserved a remarkably even surface, under all changes of temperature and weather, and under constant service. The sample of gravel road, in particular, has given most satisfactory results.

In recommending the gravel road previous to the completion of the samples, I had stated: "1st. That a gravel road is best adapted to Park purposes, being the easiest and most agreeable kind of road for both carriages and horses. 2d. That it is the cheapest as to first cost, and can be kept in repair at an equal, if not less cost, than any other equally satisfactory road." These views were expressed after a careful investigation of the subject, and some previous experience, and although not immediately adopted, they have been fully sustained by the ultimate results, as will be seen in the further description of the roads of the Park. The relative cost of the samples—the details of drainage, silt basins, gutters, etc., being common to all—was about as follows:

Gravel road	1·
Telford road	1·50
MacAdam road	1·75

Omitting from the estimate the bottom layer of stone in the gravel road, and allowing for the reduction of the depth of the Telford and MacAdam roads in about the same proportion (as was afterward the case), gave the following results:

Gravel road	1·
Telford road	1·65
MacAdam road	1·70

The MacAdam stone used in the Telford and MacAdam samples were broken by hand, but a proposal having been made during the progress of the work (which was afterward accepted) to break the stones by a machine, at a reduced cost, the above estimates of relative cost have been made by using the data of machine-broken stone. In proceeding with the construction of the Park roads in 1859, the MacAdam and Telford methods were mainly followed during that year. The depth of road material was reduced, as before stated, to about twelve inches. About 7000 feet of MacAdam road, and 6000 feet of Telford road, were built during that year. The MacAdam road had, as a first layer, a depth of broken gneiss stone of 7 inches, with a top layer of 5 inches of the harder boulder stone. The Telford road, in nearly equal portions, was composed (above the pavement), in the one case, of the hard boulder stone, and in the other of 2 to 3 inches of the gneiss stone, surmounted with 3 to 4 inches of the boulder stone. About 3000 feet of road that was commenced on the Telford plan, was modified (owing to circumstances not within the control of the engineer) after the paved foundation was laid, and 2 to 3 inches of broken gneiss stone deposited on it, *by substituting in place of the superior hard broken stone, as had been intended, a light layer of gravel.* The combination of broken stone and gravel was not found to work well. The gravel was surfaced and partially intermixed with limestone chips and stone dust—(refuse from lime-kiln quarries and detritus resulting from the breaking of large quantities of MacAdam stone)—and was very thoroughly rolled, but from the want of homogeneity in the broken stone and gravel, a proper bond or union of the two did not take place, and a tendency of the gravel layer to separate and peal off from the stone below was exhibited soon after the road was brought into use. This was especially the case in wet weather, the surface gravel being removed in the form of large flakes by the action of wheels and horses' feet. This portion of road was the least satisfactory (until subsequently remedied) of any of the kinds built, and the practice was not continued.

During the following year, 1860, being the second year that the samples of road had been in partial use, about 2000 feet of Telford road was constructed, and the further extension of both the Telford and the MacAdam roads was thereafter discontinued. The public use of the sample of gravel road, had demonstrated, in the mean time, the qualities claimed for it, and developed a clear preference, on the part of the citizens of New-York, for that kind of road. It was evident that they would be satisfied with no other of the tried forms, however perfect and complete they might be made. During this year, about one mile of gravel road was commenced and mainly completed. The plan was the same as that of the first sample, with the exception that the bottom layer of stone, before mentioned, was omitted, and the depth of road material reduced to about twelve inches. Upon this plan, about half a mile in addition was subsequently constructed—that is, with the Telford pavement as a base, when the plan was further modified, for purposes of economy, by substituting for the pavement a mere deposit of rubble-stones, and with this latter modification, gravel roads were thereafter exclusively adopted for the remainder of the work. The accompanying engraving represents the plan of the Telford road with illustrations of drainage, silt basins, etc.

The following statement shows the total length of the Park carriage-roads, the lengths of the different kinds of road, and the different widths:

KINDS OF ROAD.	Miles.	Feet.
MacAdam road—Material all of broken stone,	1	2434
Telford road.—Sub-pavement, with broken stone on top,	1	1684
" " Sub-pavement, with a layer of broken stone intermixed with a top layer of gravel,		3038
Gravel road.—Sub-pavement, with gravel on top,	1	1070
" " Quarry rubble-stone bottom (not paved) with gravel on top,	4*	5145
Total	9	2811

LENGTH OF ROADS OF DIFFERENT WIDTHS.

Widths.	Miles.	Feet.
55 to 60 feet	1	1795
50 to 55 "	0	2491
40 to 45 "	3	2206
30 to 33 "	4	158
16 to 25 "	0	1141
Total	9	2811

With this general reference to the subject, I proceed to a more full and detailed description of plans and materials of construction.

[To be continued.]

* The only instances of similar gravel roads that had come under my observation previous to this time were two specimens that I had built on private grounds: the one in the District of Columbia, and the other in Westchester county in this State. The first road had been in use about three years, and I had received very favorable accounts of it; the other was built for my own use, and had not been so long under service.

* Of this about two-thirds of a mile was finished with coarse-screened gravel, which will be further mentioned hereafter.

Opals.

WHEN a good fiery opal is examined in day, sun, or artificial light, it appears to emit vivid flashes of crimson, green, or blue light, according to the angle at which the incident light falls, and the relative position of the opal and the observer, for the direction of the path of the emitted beam bears no uniform proportion to the angle of the incident light. Examined more closely, the flashes of light are seen to proceed from planes or surfaces of irregular dimensions inside the stone, at different depths from the surface, and at all angles to each other. Occasionally a plane emitting light of one color overlaps a plane emitting light of another color, the two colors becoming alternately visible upon slight variations of the angle of the stone; and sometimes a plane will be observed which emits crimson light at one end, changing to orange, yellow, green, etc., until the other end of the plane shines with a blue light, the whole forming a wonderfully beautiful solar spectrum in miniature. The colors are not due to the presence of any pigment, but are interference colors, caused by minute striæ or fissures lying in different planes. By turning the opal round and observing it from different directions, it is generally possible to get a position in which it shows no color whatever. Viewed by transmitted light, opals appear more or less deficient in transparency, and have a slight greenish-yellow or reddish tinge.—*From London Engineer.*

THE ENGINEERING AND MINING JOURNAL.

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PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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Publishers and Proprietors,
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P. O. Box 5969. New-York City.

The Æsthetic in Engineering.

TRUTH should be a guide for every action of our lives, not only to be followed in all operations of society, but in every change of matter occasioned by our hands. Nature is ever truthful—the trees, the mountains, and every familiar or unfamiliar natural object is an expression of truth. Scientific research is not possible unless all its gradations be conducted by relentless truth. But this term truth is too often misconstrued or misused, and the numerous forms, abstract and positive, through which it passes are those which cause much serious miscomprehension. It is its more positive or practically applied sense which appeals to the majority of intellects, to the exclusion of all others; and hence the misused term *practical* so commonly applied to all forms of truth. The vulgar conception of the "artistic" is that of *impracticable*, and we suggest that this is occasioned because the truth of the artistic is not in so apparent a form as that of the directly applied or constructive arts. A work of fine art must be an expression of truth, and inasmuch as each detail harmonizes with a truthful whole, so is the work beautiful or spurious. If the work is the former, it is morally artistic; if the latter, it is immorally artistic; and here we may affirm that the æsthetic and ethic have a more intimate connection than is generally allowed. Examples to illustrate the apparently complex and contradictory forms of truth, in our conceptions of the artistic, can be readily presented, and although the use of direct example may be objectionable, as a rule, we plead for the exception in this case. A column of the third order, the "Ionic," if constructed to the standard proportion, appears to the eye to taper from the plinth to the capital in a regular proportion; but this is not actually so, as the diameters of the shaft are in varied proportion, but the column will only be truthful if this arrangement be adhered to. If observation were limited to the cause, untruth would be presented; if to the effect, truth. We might mention here, parenthetically, even this observed untruth is only an apparent one by logical inference. If an artist were to make a representation of any object, and were to represent a copy of that object almost as precise as a photograph, the result might or might not be artistic. In the majority of cases, it would be worthless as a work of art, and although a realism of the subject copied, would be actually an untruth; whereas an artist might represent the same subject according to the principles of fine art apparently exceedingly unlike the original in parts, but as a whole it would so affect the imagination as to call forth all the sentiment and reflection that would be created by actually regarding the original object; and thus truth would be executed in an apparently false form—truth, with all its practical and beneficial objects.

The results of the photographically correct copyist might be artistic, inasmuch as the subject *per se* was artistic. The disposition of the original might call forth many, if not all, the reflections and sentiments that would result in the appearance of the work of the true artist. Hence the reason that some photographers, by the exercise of artistic taste in the treatment and disposition of their objects, can produce an artistic effect; and here again apparent falsity results in actual truth. Having thus cursorily pointed out some principles of æsthetics; having shown the actual association of fine arts with practical forms, and also having pointed out the close connection of æsthetics with ethics, we have arrived at a stage of our subject where the influence and advantages of a cultivation of the artistic, or, in other words, the sublime and beautiful in all our applications of the arts, and more particularly in our consideration of the constructive arts, will be shown. A city springs up on the banks of a river, a bridge is needed, and a bridge is built; the animal instinct—if we may use the expression—demanded the bridge, and the bridge alone; economy was the law which governed, and demand that which caused its erection; but little thought was given to its architectural correctness, for absence of education shows no necessity for any thing further than its utilitarian serviceableness. As the people of the city advance in education, they become less reluctant to withdraw their means from beautifying the structure; objectionable straight lines are replaced by gracefully curved ones, and uncouthness gives way to elegance. The people are educated by this example, their artistic morality is improved, and their conceptions are purified even from the contemplation of a bridge; and when this city of our imagination has developed itself into a greater one, and another bridge is demanded, the people discover that their second bridge can be built with elegance and economy—nay, more, that the mechanically economical bridge can be rendered in itself a beautiful structure.

This process is really going on, although with such subtlety that its progress is not at present appreciable; and we, the engineers, the architects, and all constructive operatives, should assist this work. We observe, as an indication of the advancement of education in this country, that there is everywhere a desire for the artistic, and taking into consideration the youth of the country, immense strides have been made in the fine arts; indeed, there are enthusiasts who see clearly the outline of essentially national art views gradually developing; and notwithstanding the severe comments of European critics on the present character of public art taste in America, when the nervously and hungrily inquiring character of the American is taken into consideration, we shall find an almost involuntary development of sound artistic principles exhibited in our bridges, reservoirs, buildings, paintings, sculpture, and theatres. That a nation so devoted to commercial pursuits as is the American is incapable of giving attention to the cultivation of the fine arts other than in individual cases, regarding fine art as a luxury and not a necessity, is a fallacy disproved by historic precedent. Surely Venice, in all her pride of commerce and artistic magnificence, should alone be a pronounced example of the possibility of the pursuits of commerce and the fine arts, being contemporaneous.

Men who have contributed by their efforts to the artistic character of the objects they daily pass are more noble, purer in sentiment, and more correct in idea than those who pass deformed objects, faithless to the very purposes of fine art. Such men are not so noble and pure, or as capable of accurate conception; they want more of the Greek in them. We should also bear in mind that the tendency of art should be republican—a republic in which all citizens are drawn together by one sentiment of beauty is a synonyme for truth. We have now arrived at that point of our rapidly treated essay which should consider the application of the views just enumerated. As our review is devoted to the constructive arts, we shall allude to the application of art principles exclusively to works of engineering construction. If we opened this part of our subject with criticisms of particular works, pointing out their imperfections and extolling their good points, we should hardly find it possible to conclude, even in a more extended article than our readers or contributors would desire, so numerous are such illustrations. Considering the subject from a general point of view, what grand opportunities for the display of a beautiful outline or pleasing effect are ruthlessly unheeded! The gas-standards in our streets, objects whose very repetition commands attention, how elegant are they in Paris! so that the repetition of three patterns not only is not tedious, but pleasing, their well-proportioned height to the breadth of foot-way and heights of street, the rich tone of their bronze (principally of cast iron electrotyped), and the conical lanterns surmounted by a crown, so superior to the sharp, ungainly outline of our own. The first cost of such lamps is a serious item, the glazing a trifle more expensive, although of more substantial construction; but should this be so serious a consideration to a municipality who could thus distribute an *art educator* throughout the streets?

Chimney-shafts, reservoirs, water-shafts, and other structures of prominence, at a very insignificant amount of trouble and cost, can be rendered objects of beauty. It is hard for the manufacturer, the builder, etc., to see his return for the extra cost of rendering a deformity a beauty, but this would not be so were he more educated. The splendid streets and symmetrical formation of our cities render fine opportunities for the display of architectural effect; our numerous railways and roads give opportunities for the erection of bridges combining mechanical economy and elegance. In America, there is also this advantage, that there is more independence of action. English architects and engineers are deluged with pattern-books of the different manufacturers. From a false spirit of economy, this nuisance has sprung up in France and Germany, so that the engineers and architects are circumscribed in their selection of decorative subjects. An English architect, instead of designing his house harmoniously as a work with a regard to circumstances or locality, etc., has to accommodate his design to certain set forms of decoration, thus always giving to it a stiff, patchy appearance. Some of these forms are artistic and good, but the majority of English builders' price-books contain very inferior designs. The French manufacturers', more particularly the iron-founders', price-books contain excellent designs. In England, ornamental girders, roofings, finials, roof-drains, window-frames, terra-cotta copings, etc., and every species of fitting are accommodated to the design in hand, according to the capriciousness or interest of the engineer or architect; if by a clever hand, their adoption is less objectionable than otherwise, but the repetition of these inartistic patterns is most injurious. American engineers and architects can at present think for themselves and apply decorations to a work without having a trade-price and pattern book before them to cripple and circumscribe their efforts. Let them take advantage of it. Great advances have been made architecturally in the application of cast iron in house construction—many of such structures in this city have great artistic pretensions. May our citizens, by their liberality in the support of art schools, and in the ready application of capital to art purposes, strive to set aside the slur of Europeans that the Americans are indifferent to fine art, and testify to the fact that she is a noble mistress than whom there is none other more worthy of being served.

Telegraph Enterprise.

ANOTHER great European telegraph project is on foot. A company just formed in London has purchased, with concessional rights, the following cables, namely: 1st, Denmark to England, from Sondervig to Newbiggin, actual distance 334 miles; 2d, Denmark to Norway, from Hirtshalts to Arendal, actual distance, 60 miles; 3d, Denmark to Russia, from Moen to Bornholm, and Bornholm to Libau, actual distance, 304 miles; 4th, Norway to Scotland, from Egersund to Peterhead, actual distance, 270 miles; 5th, Sweden to Russia, from Grislehamn to Nystad, actual distance, 96 miles. Of these, the three first are already laid, and have been for some time working; the fourth is shipped on board ready for laying; and the arrangements for the fifth are in course of completion, and both the latter are to be laid at the risk and cost of the old companies. The new company undertakes the working, and will be entitled to the receipts from the 1st of June. The cost of purchase was $2,500,000. The ultimate intention of the company is a connection with North-America *via* the Russian dominions.

Another Pavement.

WE understand that a new kind of street pavement has been devised, which, it is said, promises to be an improvement upon any of those now in use. It belongs to what may be called the *Asphaltum* class. It is composed of a substance called carbo Japanis and sand. The carbo-Japanis is made from common coal-tar by the addition of certain chemicals, and forms a very hard, solid, and inodorous cement, which is affected but little if any by changes of temperature. It is claimed, also, that it can be laid, with a good foundation of coarse gravel carbo and tar, for thirty cents per square foot, and on sidewalks for twenty cents, thus making it cost about the same as that of the Fisk pavement, while it is at the same time more durable. A composition, an improvement on which is here called carbo-Japanis, has been used for some years in Sweden, where it is said to have given satisfaction.

Giant Powder.

A CORRESPONDENT asks: "What does giant powder consist of, and where is it made?" It is nothing but nitro-glycerine, reduced to dryness by combining it with hydrated silica. The latter substance may be obtained from *waterglass* by means of an acid which precipitates a gelatinous mass from it. This mass when dry is an impalpable powder, and as such is found in natural deposits in California, where giant powder is manufactured. Mr. Nöbel, who patented several explosives, also possesses a patent for this one. It is also manufactured in New-York City, but we are not at liberty to publish the manufacturer's name without his permission.

Opening of the Missouri River Bridge.

FORTY thousand persons assembled in Kansas City, Mo., to witness the opening of the first railroad bridge across the Missouri River. The structure was put to a severe test by placing five locomotives and a train loaded with iron on each span. The result was satisfactory. The draw span is 363 feet long, and weighs 360 tons. The spans are respectively 200, 250, 200, and 117 feet in length.

Desilverization.

WE hear that M. Becquerel has been experimenting on a new electro-chemical process by which silver can be extracted from its ore without the tedious and costly practice of amalgamation. He makes use of a powerful battery with double liquid elements, separated by porous diaphragms. A trial of the system in California is meditated.

A FLOATING fire-engine is proposed to be established at St. Louis, by fitting a tugboat with the necessary apparatus, in order that the shipping of that port may be in greater security. No port should be without such a resource, although we of the Empire City, two centuries and a half a port, can only boast of such a guardian against firewithin the last few weeks.

MARKET REVIEW.

The Coal Trade.

NEW-YORK, July 15th, 1869.

THE high prices demanded for coal have a tendency to keep dealers out of the market. There is, however, a fair trade doing. The sales made are at the prices as quoted by us. Affairs in the various districts have not materially changed since our last report. The Scranton and Lackawanna Companies have not made terms with their men, and consequently continue idle. The following are the terms agreed upon by the Lehigh Coal and Navigation Company: For a car of 76 cubic feet, $1, to be topped as usual. Other cars in the same proportion by cubic measure. The miners' wages are $16 per week, and inside laborers, $14; outside, $11 to $11.50 for first-class hands. The above rates are based on the price of $5 per ton for coal on board of vessels at Elizabethport; for every advance of 25 cents per ton above $5, 5 cents additional to be paid on each car of 76 cubic feet, and 50 cents per week additional on labor. No account to be taken of an advance in the price of coal of less than 25 cents per ton. Prices of coal to be regulated by the action of the Lehigh Board of Coal Dealers in New-York at their regular meetings at the end of each month, when they will fix the prices for the following month's sales, and certify the same to the President of the Workingmen's Benevolent Association. The *Scranton Journal* says: "We learn that, at a meeting of the Carbondale miners, on Saturday evening last, it was resolved not to resume work in the mines there in ten years, unless the Delaware & Hudson Coal Company complied with their demand for a basis. The company will never, to all appearances, comply with the demands of the basisers, so there the matter rests. Meanwhile, Europe and Asia are hammering for admittance to the mines." From the *Honesdale Herald* we learn that the Delaware & Hudson Canal Company have discharged fifty more men from their docks at Rondout, and it is rumored that, if the strike continues, work will be discontinued altogether. We see it stated that a force of nearly 2000 men from the striking miners are now employed in building the new railroad from Carbondale to Lansboro.

The following table exhibits the quantity of Coal passing over the following routes of transportation for the week ending July 10th, 1869:

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.
Phila. & Read. R. R.	35,965	1,657,676	78,168	1,524,311
Schuylkill Canal,...	24,400	471,576	18,502	251,095
Lehigh Valley R. R.	21,609	1,287,176	49,161	1,062,942
Lehigh & Sus. R. R.	8,727	196,273	25,051	377,796
Lehigh Canal,..	26,168	379,356	17,489	203,165
Scranton North, ...	13,926	254,691		205,857
" South, ...	19,173	565,371		587,631
Penn. Coal Co., rail,	18,311	441,130	19,705	493,416
" " " canal,	473	11,453	717	7,844
Del. & Hudson Rail,			131	98,562
" " " canal,	50,927	631,811	19,414	549,432
Shamokin,.....		234,381		158,586
Trevorton,.....	661	9,669	1,124	8,622
Short Mountain,....		50,100		49,312
Lykens Val.,Can.Co.	1,994	43,083	1,586	31,282
Hunt'g'n & B'd Top,	4,056	119,047	5,076	179,530
Wyoming South, ...		79,102		57,631
" North. ..				
Williamstown, Col'y	2,419	89,180	3,873	82,937
Total, ...	228,809	6,520,875	239,997	5,929,951
1869,.....		5,929,951		
Decrease,.....		590,924		

Lehigh Canal Coal Trade.

Shipped for the Week Ending July 10, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,..	5,304 12	56,758 09
" B. Meadow "	2,604 12	29,067 81
" Mahanoy "		974 13
" Hazleton "	2,609 08	53,005 11
" Upper Lehigh "	98 16	2,280 10
" Wyoming "	6,872 07	61,078 15
Grand Total,.....	17,489 15	203,164 19
Corresponding week last year,	26,168 07	379,356 06
Increase,.....		
Decrease,.....	8,678 12	176,191 07

Report of Coal Transported over Lehigh Valley Railroad

For the week ending July 10, 1869, and previously this season, compared with the same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy,...	10,670 06	156,335 18	167,006 04
" B. Meadow,..	11,314 03	179,302 03	190,616 06
" M. Chunk,..		124 04	124 04
" U. Lehigh,..	229 07	7,506 16	7,736 03
" Hazelton,....	20,382 14	505,328 11	525,711 05
" Wyoming,..	7,162 03	200,234 08	207,396 11
Total,.....	49,758 13	1,048,832 00	1,098,590 13
To L. & S. R. R., at P'n Hav. for rail,		4,174 00	4,174 00
Do. for canal,.....	2,609 08	54,413 13	57,023 01
At Mauch Chunk for Canal, ...	2,604 12	29,342 09	31,947 01
Total Anthracite,..	54,972 13	1,136,762 02	1,191,734 15
Susquehanna Region Bit. Coal (Fall Creek).....		552 03	552 03
Tl. by rail & canal,	54,972 13	1,137,314 05	1,192,286 18
Same time last y'r,	32,222 19	1,347,972 07	1,380,195 06
Increase,.....	22,749 14		
Decrease,.....		210,658 02	187,908 08
Forw'd east from M. C'k by rail, ..	49,161 13	1,013,780 16	1,062,942 09
Same time last y'r,	21,609 03	1,265,566 16	1,287,175 19
Increase,.....	27,552 10		
Decrease,.....		251,786 00	224,233 10

RECAPITULATION:

Forw'd east from M. C'k by rail,...	36,386 13	977,394 03	1,013,780 16
Del. at M. Chunk,.	10 15	599 14	610 09
Del. on line of r'd above M. Chunk,	66 05	5,123 05	5,189 10
Del. ab. M. C. for use of L.V.R.R.,	513 10	24,197 18	24,711 08
To N. C. R. R., at Mt. Carmel,.....		2,516 09	2,516 09
To L. & S. R. R., at P'n Hav., for r'l.		4,174 00	4,174 00
Do. for canal, ...	132 01	54,281 12	54,413 13
Do. Packerton for rail,.....	58 12	2,516 19	2,575 11
At Mauch Chunk for canal,.....	1,637 06	27,705 03	29,342 09
Total,.....	38,805 02	1,098,509 03	1,137,314 05

Lehigh and Susquehanna Railroad.

Report of Coal Shipped for the Week ending July 10, 1869.

WHERE FROM. WYOMING REGION.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,.....	546 03	68,171 07
" Hazelton "	2,658 10	54,604 10
" Upper Lehigh "	2,352 16	59,431 11
" Wyoming "	19,073 15	309,698 07
Grand Total,.....	24,631 04	491,905 15
Corresponding week last year,..	24,480 14	382,777 05
Increase,.....	150 10	109,128 10
Decrease,.....		
Forwarded South from Mauch Chunk,..	14,467 18	342,406 10
Delivered on line of L. & S. R. R., above Mauch Chunk,...	582 15	16,550 05
Delivered to Lack. & Bloom. R. R., at Plymouth Bridge, ...		13,688 06
Delivered to L. V. R. R. Co., at Sugar Notch, ...		5,151 03
Delivered at Coal Port, for Shipment by Canal,.....	9,580 11	114,109 11
Total,.....	24,631 04	491,905 15

Schuylkill Coal Trade.

By railroad and canal for the week ending Thursday, July 8, 1869.

PLACES.	RAILROAD.	CANAL.
St. Clair, ...	29,161 11	
Port Carbon,.....	6,895 14	5,317 00
Pottsville,.....	2,753 15	518 00
Schuylkill Haven,.....	21,734 15	10,768 00
Auburn, ...	467 10	
Port Clinton,.	12,778 15	899 00
Total paying freight,. .	74,792 00	
Coal for Company's use,....	3,376 00	
Total for week,.	78,168 00	18,502 00
Previously this year,.....	1,446,143 07	232,593 15
Total,.....	1,524,311 07	251,095 15
To same time last year,....	1,657,676 07	471,375 19
Increase,..		
Decrease,.....	133,365 00	220,280 04

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW-YORK, July 8th. R. A.	W. A.	AT PHILADELPHIA, July 8th. R. A.	W. A.
SCHUYLKILL.				
Lump, ...	$....	$7 50	6 75	7 00
Steamer,.....	....	7 75	"	"
Broken, ...	....	7 75	"	"
Egg, ...	....	7 75	"	"
Stove, ...	....	8 00	"	"
Chestnut,.....	....	7 00	5 75	6 00
Pea,.....	....	....	....	....
LEHIGH.				
Lump,.....	....	....	7 00	....
Steamer,.....	....	....	7 00	....
Broken, ...	....	....	7 00	....
Egg, ...	....	....	7 00	....
Stove, ...	....	....	7 25	....
Chestnut,.....	....	....	6 50	....
Pea,.....	....	....	4 75	....
SPECIAL COALS.*				
Diamond Vein,....	R. A.	8 25	....	....
New-England,.....	"	....	....	....
Locust Dale,.....	W. A.	8 00	....	....
Honey Brook, Le'h	"	7 50	....	....
Harleigh, "	"	7 50	....	....
Spring Mount'n "	"	7 50	....	....
Sugar Creek,... "	"	7 50	....	....
Sugar Loaf,..... "	"	7 50	....	....
Fulton,..... "	"	7 50	....	....
Stout,..... "	"	7 50	....	....
Old Comp'y's,.. "	"	....	....	....
Cross Creek,.... "	"	7 50	....	....
Chauncey,..... "	"	....	....	....
Girardville,..... "	"	....	....	....
McMichael,..... "	"	....	....	....
Duncan,..... "	"	....	7 00	7 50
Shamokin, ... "	"	7 00	....	7 25
Lykens Valley,.. "	"	7 25	....	7 25
Broad Top,..... "	"	....	....	5 50
Hill & Harris,... "	"	7 00	....	6 75
Henry Clay,..... "	"	7 00	....	7 00
Powelton,..... "	"	....	....	7 25
Burnside,..... "	R. A.	....	....	7 50

[* Dealers in these coals may be found in our advertising columns.]

COMPANY COALS.	L.	Str.	Gra.	Eg.	Sto.	Cst.
Scranton at E. Port,	..	..	..	..	..	..
Pittston at Newb'g,	..	..	..	..	..	..
Lacka'na at Rond't,	7 25	7 25	7 25	7 25	7 50	6 10
Wilk'b're at Hob'kn,	..	7 25	7 25	7 25	7 50	7 00

For freights to different points, see "Freights."

Prices at Baltimore, June, 1869.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load,.....	$6 75	7 00
Pittston and Plymouth,.....	6 50	6 75
Shamokin R., or W. Ash,.....	6 50	6 75
Lykens Valley, R. A.,.....		7 00
Trevorton, R. A.,.....	6 50	6 75
By retail, per ton of 2240 lbs. delivered,...	8 00	8 50
Georges Creek & Cumberland f. o. b. at Locust Point for shipping,.....		5 00
West Fairmount Gas, f. o. b.,.....		6 00

Prices at Georgetown, D. C., & Alexandria, Va.

July, 1869.

George's Creek & Cumberland f. o. b. for shipping,..... $4 75

Prices at Havre de Grace, Md.

July, 1869.

Wilkesb're & other White Ash for cargoes,	$6 75	7 00
Lykens Valley,.....	7 00	7 25
Shamokin R. or W. Ash,.....	6 75	7 25
Trevorton and Zerba Valley,.....	6 50	7 00

Prices for Coal at Mauch Chunk.

L.	Str.	Gra.	Eg.	Sto.	Cst.
Lehigh,.....	..	..	..	..	..
Wilkesbarre, ..	$4 00	$4 50	$4 50	$4 50	$4 00

Freight to Elizabethport, $2.28; to New-York, $2.35.

Prices of Foreign Coals.

June.

Duty, $1.25 per ton.

Corrected weekly by PARMELEE BROS., 32 Pine-street, New-York.

Liverpool Gas Caking,.....	$ 9 50	
" " Cannel,.....	14 00	
" House "	18 00	19 00
" " Orrel,.....	16 00	18 00

Per ton 2240 lbs., EX. Ship.

PRICES FROM YARD.

Liverpool House Orrel, screened,.....	$16 00	$18 00
" " Cannel, "	18 00	20 00

Per ton 2000 lbs., delivered.

Prices of Gas Coals.

June, 1869.

PROVINCIAL.

Duty, $1.25.

	Coarse. Gold.	Slack. Gold.
Block House,.....	$1 75 @$	75
Gowrie,.....	1 75	75
Lingan,.....	1 75	75
Sydney,.....	2 13½	71½
Pictou,.....	2 13½	1 18½
Little Glace Bay,.....	1 50	1 00
Caledonia,.....	1 50	75

Prices of Gas Coal.—Continued.

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.,...	$8 75	
Despard Coal Co.,.....	8 50	8 00
Penn,.....		
Newburg Orrel Gas,.....	8 50	8 00
West Fairmount Gas Coal,.....		8 00
AT PHILADELPHIA.		
Kittaning Coal Co.'s Phœnix Vein,..f. o. b. $	65	25
Lemon " ... ... "		5 00
Powelton,.....		7 80

Freights.

July, 1869.

To Eastern Ports.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg.	From Rondout.,
Stamford,.....	..	$1 00	$1 25	$1 25
Norwalk,.....	$2 05	1 00	1 25	..
Bridgeport,.....	2 00	1 15	1 25	1 25
New-Haven,.....	2 25	1 00	1 25	1 25
Hartford,.....	2 25	1 10	....	1 65
New-London,.....	2 25	1 15	1 35	1 35
Norwich,..	2 25	1 25	1 45	1 45
Mystic,.....	....	....	1 40	....
Stonington,.....	....	....	1 40	1 35
Sag Harbor,.....	....	....	1 40	....
Bristol,.....	2 00	....	1 55	1 60
Newport,.....	2 00	1 40	1 55	1 60
Fall River,.....	2 00	1 40	1 55	1 60
Providence,.....	2 00	1 40	1 60	1 60
Dighton,.....	2 25	....	1 60	....
Warren,.....	....	....	1 60	....
Pawtucket,.....	1 75	....	1 75	1 75
New-Bedford,.....	2 25	1 40	.	1 75
Boston,.....	2 50	1 75	1 75	1 75
East Cambridge,.....	2 75	....	1 85	....
Salem,.....	2 50	1 75	1 75	1 75
Newburyport,.....	....	2 00	1 85	1 80
Portsmouth,.....	2 75	1 75	1 80	1 80
Rockport,.....	....	....	1 80	....
Saco,.....	2 85	1 75	1 80	1 75
Portland,.....	2 50	1 75	1 75	....
Bangor,.....	2 50	....	1 75	1 80
Bath,.....	2 50	....	1 80	....
Middletown,.....		....	....	....
To River Ports.				
Troy,.....	1 95	95	60	55
Albany,.....	1 90	90	55	50
Coeyman's,.....	1 50	....	55	50
Stuyvesant,.....	1 50	....	50	45
Coxsackie,.....	1 75	....	45	45
Hudson Railroad,.....	....	1 00	40	50
Catskill,.....	....	....	40	35
Poughkeepsie,.....	1 50	75	30	25
Fishkill,.....	1 55	....	20	30
Cold Spring,.....	1 75	70	30	50
Haverstraw,.....	1 50	50	45	50
Nyack,.....	1 45	50	55	50
Sing Sing,.....	1 50	....	60	50
Yonkers,.....	1 40	40	60	55
New-York,.....	1 40	50	60	65
Saugerties,.....	1 50	....	35	30
Rhinebeck,.....	1 50	....	30	35
Rondout,.....	1 60	60	30	25
Tarrytown,.....	1 75	80	....	....
West Point,.....	1 50	75	30	50

Foreign and Provincial Freights.

July, 1869.

Foreign.	
New-Castle and Ports on Tyne,.....	£15@£18 keel.
Liverpool,.....	15s. 17s. ton.
Australian,.....	9 50@10 00
do. Wallsend,.....	10 00 10 50
Bellingham Bay,.....	11 00 ....
California,.....	7 00 9 00
Cumberland cks.,.....	30 00 32 00
do. bulk,.....	28 00 ....
Chili,.....	10 00 ....
Lehigh,.....	15 50 16 00
Liverpool,.....	13 00 ....
Pittston, ton,.....	14 50 15 00
Scranton,.....	14 00 15 00
Scotch,.....	13 00 ....
Vancouver Island,.....	12 50 ....
TO NEW-YORK.	
Provincial.	
Sydney,.....	$3 25
Lingan,.....	3 25
Cow Bay,.....	3 25
Port Caledonia,.....	3 25
Little Glace Bay,.....	3 25
TO BOSTON.	
Sydney,.....	$2 75
Lingan,.....	2 75
Cow Bay,.....	2 75
Port Caledonia,.....	3 00
Little Glace Bay,.....	2 75

Rates of Transportation to Tide Water.

[BY RAILROAD.]

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuykill Haven,..... $2 00

From Port Carbon, 8 cents per ton more.

TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton,....	$ 81
C. R. R., N. J., Easton to Elizabethport,.....	1 22
	$2 03
Shipping Expenses at Elizabethport,.....	25
Total,.....	$2 28

TO PORT JOHNSON.

L. V. R. R.,.....	$ 81
C. R. R. of N. J.,.....	1 29
Shipping Expenses,.....	25
Total,.....	$2 35

TO HOBOKEN.

L. V. R. R.,.....	$ 81
Morris & Essex R. R.,.....	1 29
Shipping Expenses,.....	25
Total,.....	$2 35

[BY CANAL.]

TO PHILADELPHIA.

From	Pt. C.	Potts.	S. H.	Pt. C.
Tolls,.....	$1 43	$1 42	$1 40	$1 04

TO NEW-YORK (Morris).

Lehigh Canal Tolls,.....	$ 40
Morris Canal Tolls,.....	45
Freight,.....	1 55
Towing,.....	10
Total,.....	$2 50

TO NEW-YORK (Delaware and Raritan).

Lehigh Canal Tolls,.....	$ 40
Delaware Division Tolls,.....	30
Delaware & Raritan Tolls,.....	35
Freight,.....	1 25
Towing from New-Brunswick,.....	20
Total,.....	$2 50

TO NEW-BRUNSWICK for Re-shipment.

Lehigh Canal Tolls,.....	$ 40
Delaware Division Tolls,.....	30
Delaware & Raritan,.....	35
Freight,.....	1 05
Shipping,.....	25
Total,.....	$2 35
Drawback,.....	10
	$2 25

Metals.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1½ cents ℔ lb; Pig, $9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

Pig, Scotch, No. 1, ℔ ton,.....	38 —@50 —
Pig, American, No. 1,.....	42 — — —
Pig, American, No. 2,.....	38 — 39 —
Pig, American, Forge,.....	36 — — —
Bar, Refined, English and American,.....	85 — 90 —
Bar, Swedes, assorted sizes (gold),.....	82 50 87 50
STORE PRICES.	
Bar, Swedes, ord'y sizes,....	less 5 ℔ ct., — — 140 —
Bar, Refined,.....	less 5 ℔ ct., 90 — 92 50
Bar, Common,.....	less 5 ℔ ct., 85 — 87 50
Scroll,.....	less 5 ℔ ct.,120 — 150 —
Ovals and Half-round,.....	less 5 ℔ ct.,117 50 142 50
Band,..... ..	less 5 ℔ ct.,117 50 — —
Horse Shoe,.....	less 5 ℔ ct.,117 50 — —
Rods, ¼ to 3-16 inch,.....	less 5 ℔ ct., 97 50 155 —
Hoop,.....	less 5 ℔ ct.,125 — 180 —
Nail Rod, less 5 ℔ ct.,.....	8¼ — 9¼
Sheet, Russia, as to Nos. (gold),..	— 11 — 13
Sheet, Single, D. and T. Common,.... ..	— 5 — 7
Sheet, Galvanized,.....	List 20 @ 25 ℔ cent dis.
Rails, English (gold), ℔ ton,.....	— 54 — 55
Rails, American, at Works in Pa.,.....	— 74 — 76

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb,	— 18 @ — 22
English Spring (2d and 1st quality),...	— 9 @ — 11½
English Blister (2d and 1st quality),...	— 11½@ — 19
English Machinery,....	— 12½@ — 15
English German (2d and 1st quality),...	— 14 @ — 16
American Blister, "Black Diamond,".	— 10½@ — 16
American, Cast, Tool, " ..	— 19 @ — —
American, Spring, " ..	— 10 @ — 13
American Machinery, " ..	— — @ — 13
American German, " ..	— 10 @ — 13

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper cents ℔ lb; Manufactured, 45 per cent ad val.

	All Cash.
Copper, New Sheathing, ℔ lb,.....	— @ — 32
Copper Bolts,.....	— @ — 33
Copper Braziers, 16oz. and over,.....	33 @ — 35
Copper Nails,.....	38 @ — 40
Copper, Old Sheathing, etc., clean,.....	— @ — —
Copper, Chili Pig,.....	— @ — —
Copper, American Ingot,.....	22 @ — 22½
Yellow Metal, New Sheathing,.....	— @ — 27
Yellow Metal Bolts,.....	— @ — 27
Yellow Metal Nails,.....	— @ — 27

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cts. ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs,.....	— — @ — —
Spanish (gold),.....	$6 30 @ $6 37½
German "	6 30 @ 6 50
English "	6 30 @ 6 87½
Bar,.....(less 6 ℔ cent).....	— — @ 10 50
Pipe and Sheet, "	— — @ — 12

TIN.—Duty: Pig, Bars, and Block, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold. ℔ lb.
Banca,.....	33½@ — —
Straits,.....	29½@ — 30
English,.....	29½@ — 30

Plates.	Gold.	Currency.
Fair to good brands,	— @ $8 50	$11 25 @ $12 —
I. C. Charcoal, ℔ box,.	$8 — @ $8 50	$11 25 @ $12 —
I. C. Coke,.....	6 75 @ 7 50	9 50 @ 10 75
Coke Terne,.....	5 75 @ 6 —	8 25 @ 8 50
Charcoal Terne,.....	7 50 @ 8 —	11 50 @ 11 25

SPELTER.—Duty: In Pigs, Bars, and Plates, $1.50 ℔ 100 lb.

	Gold.
Plates, Foreign,.....	℔ 100 lb. $6 37½@ $6 50
Plates, Domestic,.....	℔ lb. 11 @ 12

REMARKS.

IRON.—The demand for Scotch Pig continues without improvement, and with a large and steadily increasing stock, prices have a softening tendency; 50 tons Eglington sold at $38.50, cash. American is in moderate request, but the offerings continue light, restricting transactions to small parcels, at previously quoted rates. We notice sales of 100 tons common No. 2 Crane at $37, and 75 tons Peekskill on private terms. New English Rails continue in active request, and sales have been made of 3000 @ 4000 tons, part to arrive, on private terms. The market is firm at $55 @ $56 gold, and for American, $74 @ $76 currency at the works in Pennsylvania. Bar from store continues very dull, and buyers have the advantage.

Import, from Jan. 1st to June 30th, 1869.

	Bar.	Pig.	Sheet.
From For. Ports, tons,	8447	30,806 bdls.,	187,348
Coastwise, "	147	— "	7,109
Total,.....tons,	8594	30,806 bdls.,	194,457
Same time, 1868, 5571	"	14,392 "	95,275

The following is a statement of the amount of Pig Iron transported by the Lehigh Valley Railroad Company for the week ending July 10th, 1869: From Carbon Iron Co., 240 tons; from Lehigh Valley Iron Co., 185 tons; from Thomas Iron Co., 675 tons; from Lehigh Crane Iron Co., 820 tons; from Allentown Iron Co., 270 tons; from Robert Iron Co., 130 tons; from Glendon Iron Co., 705 tons; from Bethlehem Iron Co., 280 tons; other shippers, 150 tons. Total, 3455 tons.

COPPER has been very dull, and the sales for the week do not exceed 350,000 lbs. The quotation is 22c. for both Lake and Baltimore. 50,000 lbs. Quincy are reported at 22½c. The manufacturers are well supplied for their present wants from the purchases made for June delivery.

The English market has given way to £67 10s for Chili Bars.

TIN is quiet. Sales from dealers' hands at 29½c. @ 29¼c. for Straits; 250 slabs sold at the latter figures. Banca, 33½c.; English, 30c., all gold. The stock of Straits in first hands is held above present rates.

The London market is quoted 130 pt. for Straits, dull Banca in Amsterdam, fl. 78¾.

Import, from Jan. 1st to June 30th,	1869.	1868.
Pigs,.....	No. 22,758	48,087
Plates,.....	bxs., 591,333	385,633

LEAD.—Sales of 250 tons ordinary Spanish, part to arrive, at $6.25 gold. The quotation is $6.30 for all kinds of ordinary. 100 tons double refined German were sold at $6.70.

Import, from Jan. 1st to June 30th, 1869.

From Foreign Ports,.....	pigs, 280,223
Coastwise Ports,.....	" 1,610
Total,.....	pigs, 281,833
Same time, 1868,.....	214,695

SPELTER is dull at $6.50 gold, for Silesian and Belgian. Sales 25 tons at a little below this figure.

Import, from Jan. 1st to June 30th.

1869,.....	plates, 235,314
1868,.....	plates, 94,740

STEEL.—There is no change to note.

ZINC.—We quote American Dry, 8c. @ 8¼c.; French Dry, 11¼c. @ 12c.; Metallic, 12c. @12½c. Duty, 2½c. per pound.

Mining Stocks.

NEW-YORK, July 15th, 1869.

AMONG the sales at the Mining Board yesterday were: Quartz Hill at $1.10; Gregory, $1.55 @ $1.60; Grass Valley, b. 3, 60c.; Smith & Parmelee, s. 3, $2.10. The transactions in Petroleum shares comprised: Bennehoff Run at 25c., and United Petroleum Farms at 19c.

Wallkill Lead, assented, sold at 15c.

The following table exhibits the market prices for Mining Stocks in this city:

	Bid.	Asked
Benton Gold	$ 17	40
Consolidated Gregory	1 60	1 70
Grass Valley	52	57
Gunnell Gold	—	50
Mariposa	8½	8¾
" pfd	14	15½
Montana Gold	13	15
Quartz Hill	1 05	1 10
Smith & Parmelee Gold	2 05	2 20
N. Y. and Eldorado	20	1 00
Combination Silver	2 00	4 75
Quicksilver	15¼	16
Flint Steel River Copper	—	4 00
Wallkill Lead	8	—
Wallkill, assented	14	15
Cumberland Coal	31	34½
Lehigh and Susquehanna Coal	75	—
Buchanan Farm Petroleum	—	59
Central	60	68
National	—	2 50
N. Y. & Alleghany	75	1 40
Northern Light	40	—
Pithole Creek	—	2 00
Rynd Farm	15	—
United Petroleum Farms	—	20
United States	90	1 00
Rathbone Oil	—	45
Blood Farm	1 50	2 75
Bliven Oil	25	—

SAN FRANCISCO, CAL., July 12th, 1869.

Stocks.	Bid per ft.	Share.
Gould & Curry	118	115
Savage (per share)	91	
Chollar Potosi	301	305
Ophir	22¼	
Hale & Norcross	132	131
Crown Point	52	51
Yellow Jacket	61	69
Belcher	25½	
Imperial (per share)	65	
Alpha (per share)	26	
Kentuck	164	165

ASSESSMENT, ETC.

Imperial Mining Company, $5, coin, per share. Delinquent August 18th, 1869. Sale September 8th.

A portion of the Yellow Jacket Mine, at Gold Hill, Nevada, has been reclosed on account of the prevalence of smoke and gas. It is believed the fire is still burning in the Crown Point Mine.

BUSINESS NOTES.

Instruction in Practical Geology and Mining.

WE have before us the annual calendar of McGill College, Montreal, which illustrates the liberality and completeness of the courses of instruction adopted in that establishment. We remark with much interest that great attention is given to the scientific character of the education, and the *regime* under this head appears to be most efficient. Scientific education, with all its concomitant advantages of liberality and precision of thought, will be a constant subject of attention with us; and an institution entertaining these views will be ever one to be commended. McGill College has extended its scientific instruction to that of practical geology and mining, a great want in Canada. A school will open in the fall, devoted to instruction in the practice of mining, and a thorough grounding in the science of geology.

MISCELLANEOUS.

The Earth-Closet Company.

OFFICE:

209 State Street, Hartford, Conn.

SALESROOMS:

597 Broadway, New-York.
513 Market Street, Philadelphia.
19 Doane Street, Boston.

Send for Circulars containing full information and for working drawings, to the Hartford Office.

ALSO FOR SALE

PREPARED DRY EARTH FOR DRESSING WOUNDS AND SORES.

July 20

Valuable Coal Lands in Virginia FOR SALE OR LEASE.

The undersigned, in pursuance of a decree of the circuit court of the county of Henrico, in the State of Virginia, made on the 3d day of May, 1869, will receive proposals in writing, either for the purchase or lease, from and after the 31st December, 1869, of the whole, or any part, of the coal lands situated in Chesterfield county, Va., belonging to the Chesterfield Coal and Iron Mining Company.

The lands cost said company more than $300,000. The mines which they contain have been, and are now being, profitably worked by the present lessees, and the property is considered of great value for its coal and iron ore.

The different tracts are known as follows:

"Wooldridge's and Falling Creek," containing about 204 acres.
"Black Heath," 99 acres.
"Barker and Branch's," 99 acres.
"Harvie and Harris's," 224 acres.
"Cullin's," 76 acres.
"Martin's" (one tract), 30 acres.
"Martin's" (another tract), 326 acres.
"Salle Pits," 200 acres, and a coal-yard and land attached thereto, on James river, opposite Richmond, containing upward of 4 acres.

Inquiries and proposals may be addressed to the undersigned, post-office box No. 342, Richmond, Va., until the 20th day of October, A.D. 1869.

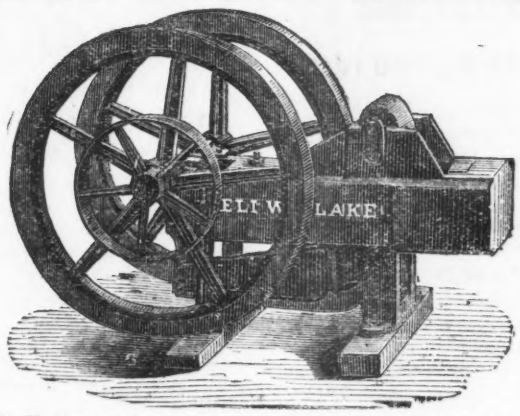
It is recommended that the proposals be made as specific as possible, since the decree requires them to be reported to the court for its approval or disapproval at the next term, commencing on the 25th day of October, 1869.

ANDREW JOHNSTON,
POWHATAN ROBERTS,
Special Commissioners.

July 6-3t

MINING MACHINERY.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter, to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well-contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly wheel, are made and used in violation of our patent.

March 14-1y 351 **BLAKE BROTHERS, New-Haven, Conn.**

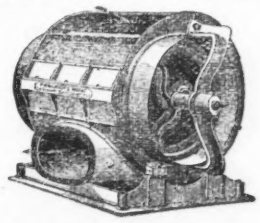
GREAT WESTERN
Mining and Manufacturing Company.
CHAS. HENDRIE, President.

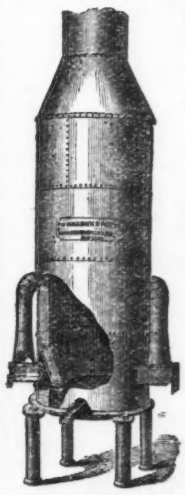
MANUFACTURES OF MINING MACHINERY,

AND WHOLESALE DEALERS IN

Mining Supplies.

Our list of patterns includes all the improved processes for the procuring and saving of Gold and Silver from the ores, and it is the intention of the company to procure the right to manufacture all new improved mining machinery as fast as brought before the public. Our list, in part, is composed of the following machinery: Quartz Mills, stamps of any weight desired. Engines and machinery for same, of any size or description known to the trade. Amalgamators, Crushers, Desulphurizers, Engines, portable, hoisting, and pumping, of the most approved construction. Saw Mills, portable or stationary. Shingle Machines, H. H. Low's Patent. We also furnish in lengths to suit, Steam and Conducting Pipes, Steam Gauges, Brass Fixtures, Bolts, Belting, and, in fact, every thing needed by Mining Companies. Our works are located at the following places: BURLINGTON, Iowa; COUNCIL BLUFFS, Iowa; CENTRAL CITY, Colorado, and HELENA, Montana. The advantage of ordering machinery of us will be plainly seen from the fact of our having branches of our works in the mining regions, thereby enabling the companies to procure their repairs there, without having to send back to the States for same, which they would be compelled to do did they procure their machinery at an Eastern shop. Our prices here are the same as the Eastern prices, thereby saving to the companies the extra expense of freight to the West. We will contract to deliver freight at any point on the Missouri River, and will be prepared to send a competent man to superintend the erection of the machinery at the mill if desired. Plans and specifications of the mills furnished to all ordering machinery of us. We would be pleased to receive an order from you for any thing in our line, and feel confident we can fill it to the satisfaction of your company. All orders for machinery should be addressed to WM. C. HENDRIE, Secretary, Burlington, Iowa. Address for information to C. F. HENDRIE, Council Bluffs, Iowa. CHAS. HENDRIE, Helena, Montana. May 29-6m





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SMELTING FURNACE.

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GAS EXHAUSTER and COMPENSATOR. Address

SMITH & SAYRE

MANUFACTURING COMPANY, 95 Liberty Street, N. Y. Send for illustrated pamphlet. Mar. 26-1y

English Gun Cotton.

About 1500 pounds very superior ENGLISH GUN COTTON,

IN WATER-PROOF COVERING,

(surplus stock) may be had at less than cost of importation. Address

A. K. P. Welch,

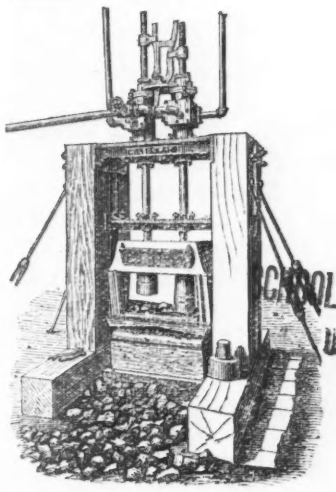
Agent of Commonwealth of Massachusetts,

Apr. 10-3m CAMBRIDGE, MASS.

THE WILSON PATENT
STEAM STAMP-MILL COMPANY,

OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



NEW STEAM STAMP-MILLS

AT THE SHORTEST NOTICE.

These Mills have now been in operation for upward of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any Mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For full particulars, call on or address

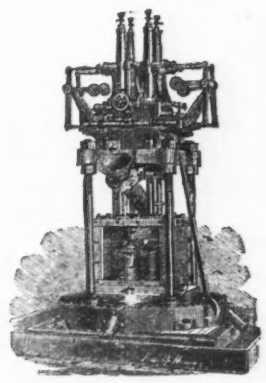
THE WILSON PATENT STEAM STAMP-MILL COMPANY,

326 WALNUT STREET, PHILADELPHIA.

May 7-1y

New-York Steam-Engine Company,

Manufacturers of



STEAM STAMPING MILLS,

Stationary and Portable Engines,

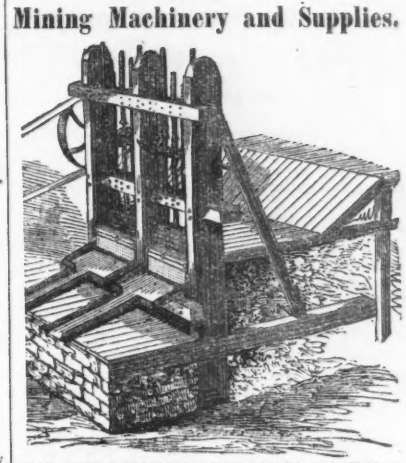
Engine Lathes, Planers, Bolt Cutters, Upright Drills and Machinists' Tools of all descriptions.

OFFICE AND WAREROOMS,

Jan. 2-1y-is Nos. 126 & 128 Chambers St., N. Y.

MINING MACHINERY, ETC.

Mining Machinery and Supplies.



CALIFORNIA STAMP MILLS,

With Iron or Wood Frames.

WHEELER & RANDALL'S

PATENT

Excelsior Grinder and Amalgamator.

Conoidal Separator and Tabular Concentrator,

With Self-Discharging Quicksilver Apparatus.

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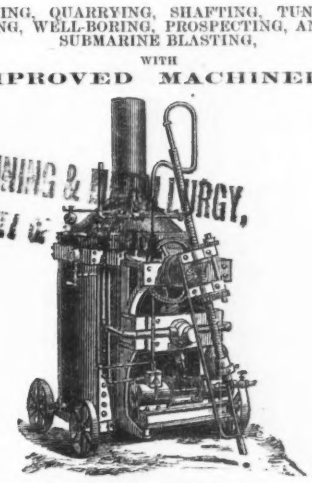

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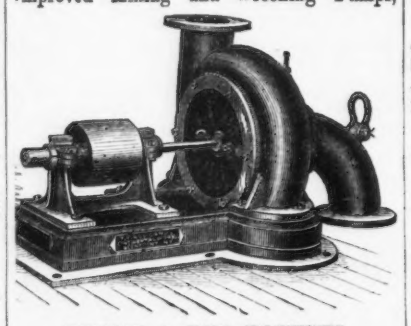

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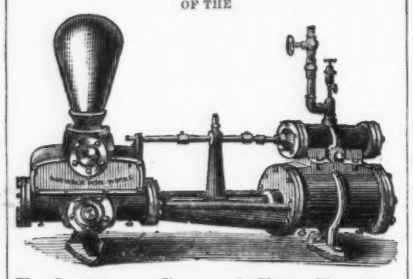

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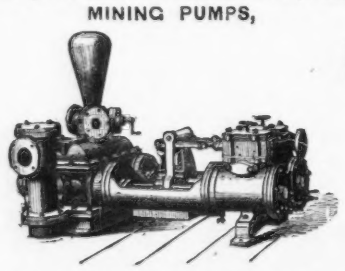

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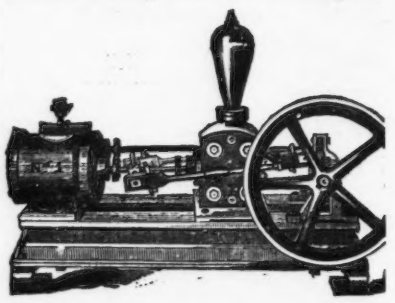

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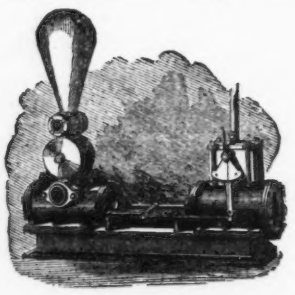

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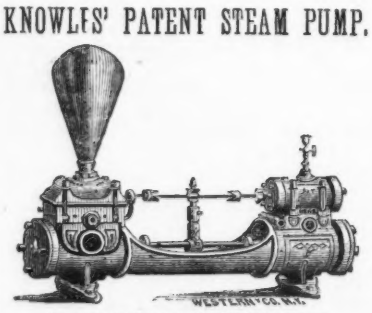

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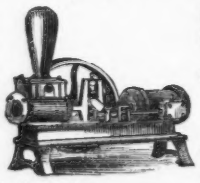

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☞ Special attention given to Fertilizers.
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PROFESSOR OF MINING AND METALLURGY,
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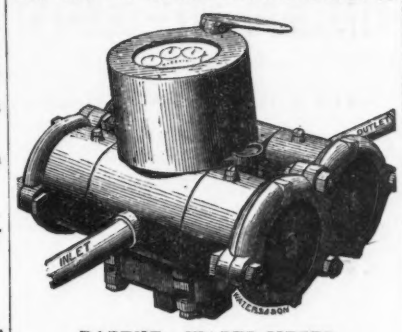

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IT COMBINES
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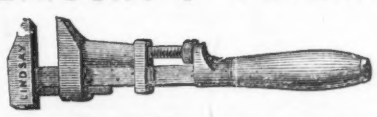

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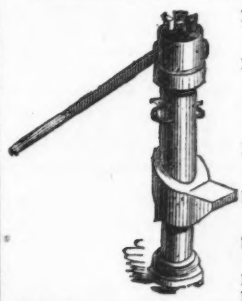

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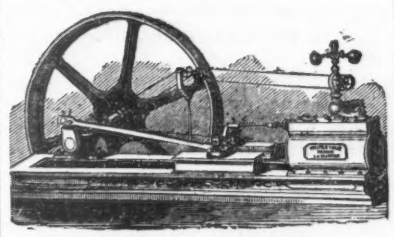

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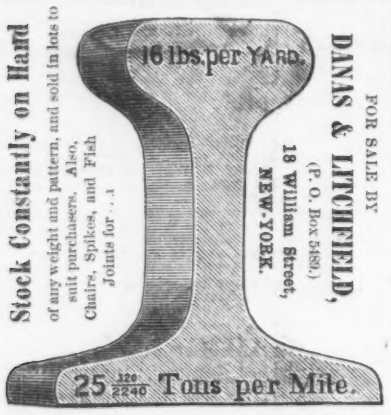

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